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ABSTRACT

With funds from the International Business Machines (IBM) Corporation, Project SYNERGY was launched in January 1990 to address the problem of students entering colleges underprepared in basic skills and to make use of the tremendous potential for significant remediation through computers. Twenty-two institutions in the United States and Canada, led by Miami-Dade Community College (M-DCC), participated in reviewing and implementing computer software for community college students. This Year Two Report of the project is presented in three parts. Following introductory comments by Kamala Anandam, in part I Lorne Kotler summarizes the results of the software review process, undertaken by faculty in the participating institutions, which included 255 reviews of 172 different software packages. This section contains 22 tables detailing ratings of individual software programs for reading, writing, and mathematics. Part II, introduced by Victor Nwankwo, provides six software implementation case studies conducted by faculty at M-DCC, including: (1) "Use of PLATO Programmed Logic for Automated Teaching Operations for Reading," by Daisy Walker; (2) "Use of CSR Computer Systems Research, Inc. for Reading," by Gabriel Read; (3) Use of PLATO for Writing," by William Tillett; (4) "Use of CSR for Writing," by Elaine Ludovici; (5) "Use of Realtime Writer for Writing," by Elena Perez; and (6) "Use of PLATO for Math," by William Hajdukiewicz. Finally, part III presents an overview of future plans for four follow-up projects, and for Project SYNERGY II. Appendixes include lists of software attributes, reading, writing, and mathematics objectives, and software publishers; and descriptions of the electronic classroom and applications software. (JSP)

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Project SYNERGY

Software Support for Underprepared Students

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Year Two Report

JC 920 286

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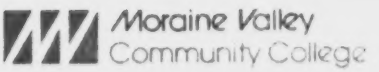

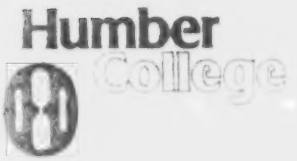

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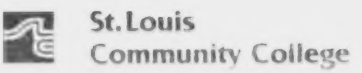

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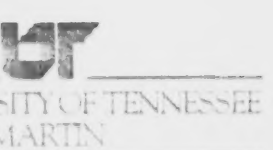

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Project SYNERGY

Software Support for Underprepared Students

Year Two Report

April 1992

Miami-Dade
COMMUNITY COLLEGE

Division of Educational Technologies
11011 S. W. 104 Street
Miami, FL 33176
(305) 237-2551

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FOREWORD

Underprepared students are a major concern to colleges throughout the country. Because IBM has a strong commitment to support efforts to help solve this problem, we are pleased to have provided support to Project SYNERGY I and II.

The results of the application of computer technology to the education process for students underprepared to perform college-level work are encouraging.

This report contains software reviews and software implementation studies that should be helpful to all faculty members who are concerned about improving their effectiveness in this difficult area.

The work described in this report represents the efforts of a consortium of educational institutions. The consortium ensures a broad spectrum of viewpoints, enables all participants to have the benefit of what others have done, and greatly increases the likelihood of new techniques and discoveries being used in many colleges and universities in this country and abroad.

IBM is honored to be a partner with Miami-Dade and the consortium. We look forward to continued progress as we expand the scope of Project SYNERGY to include study skills/critical thinking and English as a Second Language (ESL).

John C. Porter

John C. Porter
Director of Education &
University Relations, IBM

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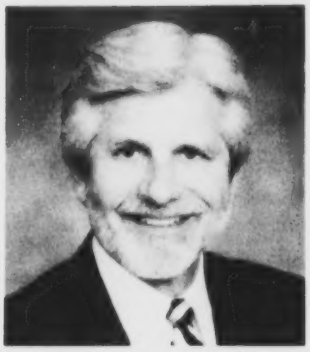
National Significance of Project SYNERGY



The League for Innovation in the Community College, its board of directors, and its member institutions recognize their fundamental responsibility to assist community colleges to serve effectively students with a broad range of backgrounds. In particular, the League affirms the critical importance of providing programs and services to meet the needs of students whose academic skills, value orientations, economic circumstances, or cultural backgrounds leave them underprepared to succeed in college programs leading to degree achievement or career preparation.

Serving underprepared students effectively, then, is a major priority of the League and its member colleges. That priority is perhaps best illustrated in Project SYNERGY.

The IBM Corporation, a partner with the League for Innovation for the past 24 years in developing innovative solutions to difficult problems, has provided generous support for Project SYNERGY. We are most appreciative of IBM's interest in the critical problem of serving underprepared students, and we particularly appreciate the contributions of the 84 faculty members from 22 institutions across the country who have participated in reviewing software for community college students needing assistance with basic skills development.

Project SYNERGY has been and continues to be a model of collaborative effort among these 22 institutions, with leadership from Miami-Dade Community College, which serves as the coordinating agent for this important project. The support and leadership of the outstanding staff at Miami-Dade Community College are responsible for this project's success.

With this *Year Two Report*, we are pleased to share with community colleges, colleges, and universities across the country the results of software reviews and software implementation as the first steps in an ambitious project that addresses one of the most crucial problems facing all of us in higher education today. With IBM's continuing support and Miami-Dade's continuing leadership, it is our intention to address the challenge of helping underprepared students become prepared in ways we have not dared dream of in the past.

Terry O'Banion

Terry O'Banion
Executive Director
League for Innovation in the Community College

Acknowledgments

We gratefully acknowledge the contributions of individuals and institutions to Project SYNERGY. In particular...

The International Business Machines (IBM) Corporation for its awards to and partnership with higher education to seek solutions for the problems of underprepared college students.

The League for Innovation in the Community College for nurturing inter-institutional collaboration.

The publishers who have provided their software for evaluation.

The Roach Organization, Inc. (TRO), Computer Systems Research, Inc. (CSR), and RealTime Writer for making available their software for evaluation in a networked environment.

The College Board for providing its Computerized Placement Tests (CPT's) for pre- and post-testing in the software implementation studies.

The staff of ISAAC for establishing an electronic forum and database for Project SYNERGY.

The faculty reviewers and administrators of participating institutions and the five campuses fo Miami-Dade Community College.

M-DCC North Campus administrators and faculty for their support and participation in the software implementation phase.

The staff of Educational Technologies for their team effort to make it all happen.

Dr. Robert H. McCabe, College President, for his vision and mission in addressing the problem of basic skills deficiencies among college students as a national issue;

Miami-Dade Community College's Board of Trustees for its commitment to and support of the college's philosophy to provide a second and third chance to the students in the community.

Jon Alexiou, Chair
Project Steering Committee

Kamala Anandam
Project Director

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Introduction

Kamala Anandam
Project SYNERGY Director
Miami-Dade Community College

This *Year Two Report* marks the completion of the first two years of Project SYNERGY and the launching of Project SYNERGY II for another two and a half years. We take this opportunity to share with you our accomplishments thus far and our plan for the future.

Project SYNERGY was launched in January 1990 to address the problem of students entering colleges underprepared in basic skills and to make use of the tremendous potential for significant remediation through computers. It was initiated under the auspices of the League for Innovation in the Community College and supported by a $1.3 million IBM grant. Participating in this project are 22 colleges and universities in the United States and Canada.

As I have mentioned on several occasions, Project SYNERGY has been the right project, at the right time, and for the right reasons, with the right players with at least some of the right answers. It is a project that has focused on the problem of basic skills deficiencies witnessed among college students at a time when the problem has grown national in scope and has captured the attention of leaders in communities, education, politics, and industries.

What has emerged through Project SYNERGY and what we hope will be further reinforced in Project SYNERGY II is the phenomenal benefit accruing from purposeful collaboration among higher education institutions, and between the higher education community and industry (IBM in this case). Through Project SYNERGY, we have demonstrated that hardware and software alone will not solve this problem and that concerned people's time and energy must be integral to the solution. We have also demonstrated that the grassroots involvement of faculty — the practitioners who actually teach the underprepared students — has contributed significantly to the success of this project. Furthermore, arising out of our efforts in Project SYNERGY is a Software Implementation Model that holds promise for meeting the challenge of integrating technological solutions into teaching and learning.

These aspects of Project SYNERGY — purposeful collaboration, faculty involvement, and a Software Implementation Model — have emerged in the foreground as the enduring accomplishments of Project SYNERGY.

The *Year Two Report* is presented in three parts. Part One presents the results of our efforts in reviewing existing software for teaching students underprepared in reading, writing, and mathematics. The reviews were completed by faculty from the participating institutions. As of this report, 172 software packages have been reviewed, yielding 255 reviews and thus providing multiple reviews for some of the packages. It is our aim to have three reviews per software package by the end of Project SYNERGY II. These reviews are being made available to the educational community through printed reports such as the present one and electronically through the ISAAC database. In the near future, the reviews will be

distributed through *Project SYNERGY Software Selector (PS³)*.

One of the faculty reviewers' persistent criticisms of existing software developed by various publishers is that there are no standard requirements for student interaction with the software (student interface). In our attempt to address this issue, we have selected a small number of software packages reviewed by faculty and have approached the publishers to convert their software to a Windows environment, since the latter is structurally suitable to provide a standard student interface.

Part Two of the report presents the results of our efforts in replicating the research studies based on the Software Implementation Model. These studies were designed and conducted by faculty who teach underprepared students at the North Campus of Miami-Dade Community College. In the Software Implementation Model, we have promoted an internal frame of reference for faculty to get involved and to evaluate the outcomes through well-designed research studies. We have also recommended that the research studies be designed as formative evaluation in order to make the requirements of research studies doable by the faculty. When faculty start using the software, it takes time for them to realize all the intricacies and implications and, therefore, they need a means to modify and fine-tune their ways of using the software. Formative evaluation allows them to do exactly that. In their case studies presented here, faculty explain their modifications and outcomes.

Part Three of the report presents our plan for future activities, including those for Project SYNERGY II. We are very pleased that the accomplishments of Project SYNERGY were significant and substantial and that IBM has come forward to fund Project SYNERGY II with another $ 1.3 million grant. All but two of the consortium member institutions are continuing to participate, and we welcome Macomb Community College in Michigan and Appalachian State University in North Carolina as the new members of the consortium.

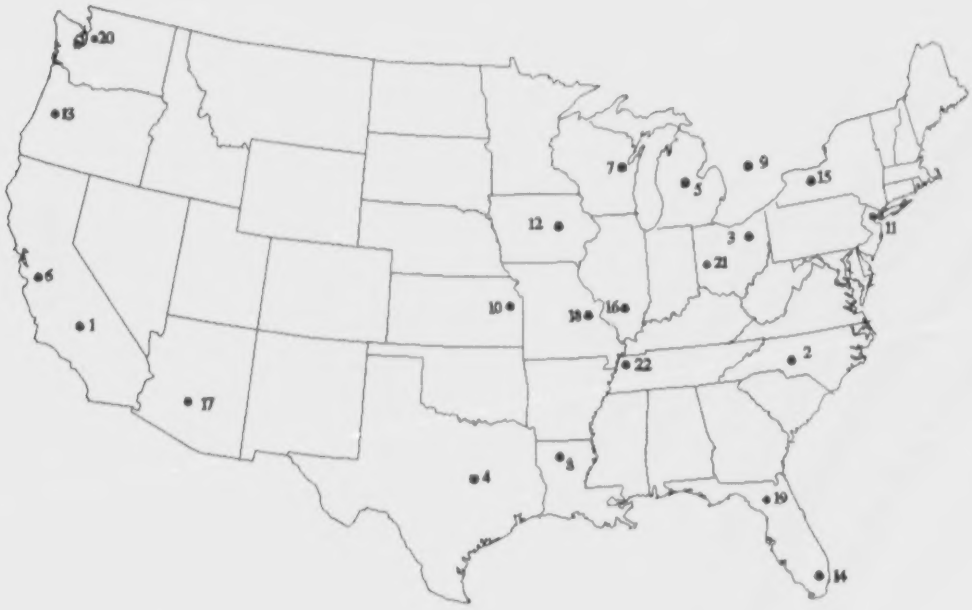
Highlights of our future activities are to expand the software review process to multimedia software and to two additional areas — English as a Second Language (ESL) and Study Skills/Critical Thinking — to establish five Centers for Software Implementation to validate the Software Implementation Model, and to create a computerized bank of questions to test students' mastery of the learning objectives included in the review of software. Lingering in the background is our continued effort to seek external funds to develop an integrated computerized management system that faculty participants have described as what they would like to have to meet their needs.

Miami-Dade Community College is privileged and honored to direct Project SYNERGY and Project SYNERGY II. We are also pleased that the project has generated a high level of camaraderie among the faculty who teach underprepared students in the various institutions across the U.S. and Canada. It is only fitting to conclude my introduction with a few faculty statements:

- "Project SYNERGY provides an opportunity to compare and share ideas, knowledge, and techniques with persons in the same discipline in many different locations. It has been an enriching experience."
- "This has been a very positive experience! We want to thank Miami-Dade and IBM for having the foresight to create such a boon to developmental education."
- "It was an excellent professional activity dedicated to student growth but supporting my own growth as a computer-literate faculty member."
- "I've enjoyed participating in this project. One of the special side benefits has been the rapport and friendship firmly established among the three participants in our institution. We've shared what's going on in our Centers and plan to coordinate our tutors' training program. I also believe the connections made with other institutions is a real benefit for us."
- "It is very difficult to express in words how very much I have gained from Project SYNERGY, but I would like to say that it has been one of the greatest educational experiences of my professional career."

The Participants

The faculty reviewing or implementing the software for this project are "grassroots" practitioners who were selected on the basis that they have experience in teaching underprepared students in one of the three disciplines, be well-respected by their peers, and demonstrate a caring attitude toward students, competence in their fields, and thoroughness in their work. The faculty's commitment to their roles has contributed greatly to the project's success. On this page and the next page is a list of their names and their institutional affiliations and coordinators.



1. **Bakersfield College (Kern)**
   David Scott, Coordinator
   Jerry Ludeke, Reading
   Phil Feldman, Writing
   Dorothy Stanley, Math

2. **Central Piedmont C.C.**
   Tom Griffin, Coordinator
   Martha Stearns, Reading
   Brenda Bilal, Writing
   Jackie MacLaughlin, Math

3. **Cuyahoga C.C.**
   Roger Williams, Coordinator
   Dennis Gabriel, Reading
   Stan Klosek, Writing
   Cora Stackelberg, Math

4. **Dallas County C.C. District**
   Rodger Pool, Coordinator
   Katherine Gonnet, Reading
   Carol Cinclair, Writing
   Vivian Dennis, Math

5. **Delta College**
   Hal Arman, Coordinator
   Margot Haynes, Reading
   Nadine Burke, Writing
   Katrina Nichols, Math

6. **Foothill C.C.**
   Bill Patterson, Coordinator
   Linda Lane, Reading
   James Whearty, Writing
   Sandra Putz, Math

7. **Fox Valley Technical College**
   Lori Wyers, Coordinator
   Nancy McFadden, Reading
   Eve Bauschek, Writing
   Heidi Higley-Nugent, Math

8. **Grambling State University**
   Dorothy Alexander, Coordinator
   Christine Paige, Reading
   Lena Carter, Writing
   Theo Portis, Math

9. **Humber College**
   Ruth McLean, Coordinator
   Sheila Susini, Reading
   Joe Benge, Writing
   Alfred Shin, Math

10. **Johnson County C. C.**
    Glen Gabert, Coordinator
    Pat Jonason, Reading
    Ellen Mohr, Writing
    Libby Holmgren, Math

11. **Kean College of New Jersey**
    William Vincenti, Coordinator
    Judy Wambu, Reading
    Margot Banks, Writing
    Isali Alsina, Math

12. **Kirkwood C. C.**
    Terry Moran, Coordinator
    Richard Edwards, Reading
    Michele Payne, Writing
    John Weglarz, Math

13. **Lane C. C.**
    Larry Warford, Coordinator
    Alice Kaseberg, Math
    Dwight Miller, Math
    Steven Myers, Math
    John Nelson, Math
    Tom Reimer, Math
    Robert Thompson, Math

14. **Miami-Dade C. C.**
    Lorne Kotler, Coordinator
    Karin Aguirre, Reading
    Jessica Carroll, Reading
    Sue Kahn, Reading
    Don Meagher, Reading
    Jan Mese, Reading
    Norbert Artzt, Writing
    Linda Brady, Writing
    Ivonne Lamazares, Writing
    Susan Orlin, Writing
    George Welch, Writing
    Larry Winebrenner, Writing
    Hugh Alban, Math
    Susan Buckley, Math
    Patrick Leitch, Math
    John Lester, Math

15. **Monroe C.C.**
    Michael Erickson, Reading
    Deborah Sak, Writing
    Carol Adams, Math

16. **Moraine Valley C. C.**
    John Rucker, Coordinator
    Jan Matula, Reading
    William Muller, Writing
    Virginia Kaiser, Math

17. **Phoenix College (Maricopa)**
    Jim Walters, Coordinator
    Steve Lucas, Reading
    Richard Malena, Reading
    Marion Bratt, Writing
    Jeanne Fitzgerald, Math

18. **St. Louis C. C.**
    Ted Rohr, Coordinator
    Rick Lake, Reading
    Joe Dunne, Writing
    Don Moser, Math

19. **Santa Fe C. C.**
    Pat Smittle, Coordinator
    Mary Landsman, Reading
    Bob Connelly, Writing
    Jeff Tennant, Math

20. **Seattle C. C. District**
    Tonia Clark, Coordinator
    Carl Waluconis, Reading
    Tonia Clark, Writing
    Marc Franco, Math

21. **Sinclair C. C.**
    Lucille Warren, Coordinator
    Benjamin McKeever, Writing

22. **University of Tennessee at Martin**
    Polly Glover, Coordinator
    Rayna Cooper, Reading
    Jenna Wright, Writing
    Tom Eskew, Math

Software Implementors

Miami-Dade C. C. (North Campus)
Victor Nwankwo, Coordinator
Gabriel Read, Reading
Daisy Walker. Reading
Bill Tillett, Writing
Elaine Ludovici, Writing
Elena Perez, Writing
Bill Hajdukiewicz, Math
Elizabeth Sotolongo, Lab Manager
Mark Paris, Lab Manager

Part One: Software Reviews

Lorne Kotler
Project SYNERGY Software
Reviews Coordinator
Miami-Dade Community College

The process of reviewing software in reading, writing, and mathematics has been highly systematic in Project SYNERGY, with an emphasis on locating software that is currently implemented in an educational setting. After the faculty identify software packages, they reserve the titles with the project's Software Reviews Coordinator, thereby insuring that a package receive no more than three reviews. Faculty are responsible for securing the software, which the publishers generally have been very cooperative in providing for review on a complimentary basis; then faculty request the project team to prepare and send a review disk specially created for each package. The review collects information about hardware requirements, learning objectives covered, instructional modes used, and operational reliability and format; it also provides plenty of room for open-ended commentary and insights. While the emphasis in this process has been on the judgments of faculty as "experts," student input has been encouraged whenever possible.

The instructional software is evaluated according to criteria that have been established by faculty teaching underprepared students. These criteria (learning objectives unique to each discipline and software attributes common to all disciplines) were evolved through several iterations starting in February 1989 at the "Workshop on Computer-Based Instructional Support for the Underprepared Student" (Miami, FL). A complete list of Software Content Attributes, Reading Objectives, Writing Objectives, and Mathematics Objectives is shown in Appendix A.

To manage the review process, the project team established and has maintained a special database to keep track of the software packages reserved, the reviewers involved, and the status of the reviews underway. When the project team receives a completed review disk, it is checked for consistency and synthesized for posting on ISAAC (Information System for Advanced Academic Computing), an electronic bulletin board and database devoted to information about the use of IBM-compatible hardware and software as aids to instruction and research at the higher-education level.

Getting on ISAAC

Developed and operated by the University of Washington and funded by IBM, ISAAC is free to faculty, staff, and students at any institution of higher education. It is accessible via PC and modem and Internet. For further information, you may call the ISAAC office at (206) 543-5604, between 8:00 am and 4:30 pm, Pacific Time, or via electronic mail at ISAAC@ISAAC.Engr.Washington.Edu, or write to ISAAC Access, m/s FC-06, University of Washington, Seattle, WA 98195.

If you have access to ISAAC and would like to see the project's software reviews, choose the database option "Instructional Software" at the main menu and use "Synergy" as the search word. You will then see a list of the Project

Progress

The review process continued strong throughout the second year of the project. As of the printing of the *Year One Report*, there were 170 reviews of 129 software packages. The reviews continued during the second year and (as of this report) there were a total of 255 reviews of 172 software packages.

Starting on the next page are syntheses of the reading, writing, and mathematics reviews posted on ISAAC as of March 1992. These are not all claimed to be *ideal* packages, merely ones that seem to have some useful applications and some satisfactorily implemented learning objectives and software attributes.

The tables highlight the coverage of objectives and attributes implemented satisfactorily as a percent of the total possible in each subcategory (some topics in writing include a category of "Other" objectives, so it is possible to exceed 100%). The tables also present reading level (except for math), number of reviews, and instructional modes implemented. A list of software publishers' names and addresses is given in Appendix B.

It should be noted that where there are fewer than three reviews, the numbers could change as additional reviews are received. Also, the faculty's open-ended comments about the uniqueness of the program, their level of enthusiasm about it, and their judgment of its appropriateness for adults and underprepared students are not quantified in these tables.

One last observation: a significant and integral feature of the software review process has been the highly positive responses of the faculty doing the grassroots work. They believe that reviewing software for Project SYNERGY has constituted a central activity of professional development for several tangible reasons: they evaluate software more critically and systematically; they understand the uses of software with their students better; and their position within their institutions as developmental educators has been enhanced. In the words of one project participant: "Some of our faculty who weren't doing much with technology are now talking up the software review process. They're not happy with the early drill-and-practice. This project has moved faculty to want to do more. It has not only raised their awareness; it has whet their appetites too."

Synthesis of Project SYNERGY Reviews for Reading

SOFTWARE ID	R001	R002	R003	R004	R005	R007	R009	R011
Reading Level (Grade Level)	10-13+	9-13+	7-8	7-8	7-8	4-12	10-13+	7-13+
# of Reviews (up to 3)	2	3	1	3	1	1	1	1
INSTRUCTIONAL MODE	**Implemented Satisfactorily? Y=yes, N=no, X=mixed**							
Drill and Practice	Y	–	Y	Y	Y	Y	Y	Y
Tutorial	Y	Y	Y	Y	Y	N	N	–
Simulation	–	–	–	–	–	N	–	–
Game	Y	–	Y	–	–	Y	–	N
Comprehensive Tool	Y	–	–	–	–	N	–	–
Partial Tool	–	–	–	–	–	Y	Y	Y
C O V E R A G E (Numbers in parentheses represent the number of objectives/attributes.)								
TOPICS	**percent of objectives implemented satisfactorily**							
Word Learning Skills (46)	17	0	20	0	0	15	20	11
Functional Reading (10)	0	0	0	0	0	0	0	0
Basic Comprehension (15)	100	13	0	53	0	0	0	0
Transitional Expressions (9)	0	0	0	0	0	0	0	0
Critical Comprehension (29)	0	0	0	14	24	0	69	0
Textbook/Technical Reading (18)	0	0	0	11	39	0	0	0
Reading in Content Areas (29)	0	0	0	0	14	0	0	0
Rate & Flexibility (11)	27	0	0	0	0	0	0	0
CONTENT ATTRIBUTES	**percent of attributes implemented satisfactorily**							
Accuracy (3)	100	100	100	100	67	100	67	100
Appropriateness (5)	100	100	100	80	80	80	80	80
Feedback (3)	100	100	100	33	33	100	67	0
MEETING FACULTY NEEDS	**percent of needs implemented satisfactorily**							
Ease of Implementation (6)	100	33	100	100	100	100	67	33
Adaptability (6)	100	50	100	100	83	100	17	83
Summary Information (6)	67	33	67	83	50	67	83	83
MEETING STUDENT NEEDS	**percent of needs implemented satisfactorily**							
Ease of Use (7)	43	43	43	43	14	57	14	43
Adaptability (4)	75	25	50	50	25	75	0	75
Testing (3)	67	0	67	0	0	67	33	0
Tracking (2)	50	0	50	100	50	100	0	50
Interactivity (7)	100	86	100	100	43	86	57	57
Appropriateness (18)	50	11	89	39	44	56	11	33
SOFTWARE OPERATIONS	**percent of operations implemented satisfactorily**							
Reliability (3)	100	100	100	100	67	67	67	100
Format (7)	43	43	29	43	43	29	29	29

The publisher is shown in parentheses in the list below:

R001 *Speed and Strategy Reading Efficiency System* (Weaver Instructional Systems)
R002 *Critical Thinking I* (Compris)
R003 *Vocabulary: Level IV* (IBM)
R004 *Reading for Meaning: Level IV* (IBM)
R005 *Reading for Information: Level IV* (IBM)
R007 *Word Attack Levels 1-9* (Davidson & Associates)
R009 *Lessons in Reading and Reasoning I* (Queue, Inc.)
R011 *Spell It* (Davidson & Associates)

Synthesis of Project SYNERGY Reviews for Reading

SOFTWARE ID	R012	R013	R014	R016	R017	R018	R021	R022
Reading Level (Grade Level)	9-13+	5-13+	1-6	7-12	6-13	3-4	9-13+	9-12
# of Reviews (up to 3)	3	3	1	3	1	1	1	1
INSTRUCTIONAL MODE	**Implemented Satisfactorily? Y=yes, N=no, X=mixed**							
Drill and Practice	–	–	Y	Y	Y	Y	Y	–
Tutorial	Y	–	Y	Y	Y	Y	Y	Y
Simulation	–	X	–	–	–	–	–	–
Game	–	Y	Y	–	–	–	–	–
Comprehensive Tool	–	–	–	–	Y	–	–	–
Partial Tool	–	–	–	Y	–	–	–	–
C O V E R A G E (Numbers in parentheses represent the number of objectives/attributes.)								
TOPICS	**percent of objectives implemented satisfactorily**							
Word Learning Skills (46)	0	0	2	11	24	54	0	0
Functional Reading (10)	0	10	0	0	0	10	0	0
Basic Comprehension (15)	100	0	20	53	67	33	20	0
Transitional Expressions (9)	0	0	0	67	11	0	0	0
Critical Comprehension (29)	34	14	10	0	62	17	7	3
Textbook/Technical Reading (18)	22	39	0	0	61	28	0	0
Reading in Content Areas (29)	7	10	0	0	41	0	0	0
Rate & Flexibility (11)	0	18	18	0	36	0	45	0
CONTENT ATTRIBUTES	**percent of attributes implemented satisfactorily**							
Accuracy (3)	100	100	100	100	100	100	100	67
Appropriateness (5)	100	100	80	100	100	100	100	100
Feedback (3)	33	100	100	33	100	100	67	100
MEETING FACULTY NEEDS	**percent of needs implemented satisfactorily**							
Ease of Implementation (6)	100	83	83	50	100	100	100	83
Adaptability (6)	83	67	83	67	100	100	67	67
Summary Information (6)	83	33	67	67	67	67	17	17
MEETING STUDENT NEEDS	**percent of needs implemented satisfactorily**							
Ease of Use (7)	71	29	71	29	43	57	100	29
Adaptability (4)	50	100	75	0	100	75	100	25
Testing (3)	0	0	33	0	100	67	67	0
Tracking (2)	50	100	100	100	100	50	100	0
Interactivity (7)	29	100	86	57	100	100	71	71
Appropriateness (18)	11	61	33	33	44	22	22	11
SOFTWARE OPERATIONS	**percent of operations implemented satisfactorily**							
Reliability (3)	100	100	100	67	100	100	100	100
Format (7)	29	43	43	29	43	43	57	43

The publisher is shown in parentheses in the list below:

R012 *SEEN* (Conduit)
R013 *Oregon Trail* (MECC)
R014 *CORE Reading and Vocabulary Development* (Educational Activities, Inc.)
R016 *Ten Steps to Improving Reading Skills* (Townsend Press)
R017 *Reading V: GED Objectives* (WICAT Systems)
R018 *BLS Tutorsystems, Adult Education Reading 100* (BLS)
R021 *SpeedReading...The Computer Course* (Bureau of Business Practices)
R022 *Analogies I* (Queue, Inc.)

Synthesis of Project SYNERGY Reviews for Reading

SOFTWARE ID	R023	R024	R025	R026	R027	R028	R030	R031
Reading Level (Grade Level)	5-6	6-13+	10-12	8-9.5	5-6.5	5-6	3-12	8-12
# of Reviews (up to 3)	2	2	2	2	2	1	2	3
INSTRUCTIONAL MODE	**Implemented Satisfactorily? Y=yes, N=no, X=mixed**							
Drill and Practice	Y	Y	Y	Y	Y	Y	Y	Y
Tutorial	X	Y	–	X	X	Y	X	X
Simulation	Y	–	–	Y	Y	Y	Y	–
Game	–	–	–	–	–	Y	–	–
Comprehensive Tool	–	–	–	Y	Y	–	Y	–
Partial Tool	–	–	Y	–	Y	–	–	–
C O V E R A G E (Numbers in parentheses represent the number of objectives/attributes.)								
TOPICS	**percent of objectives implemented satisfactorily**							
Word Learning Skills (46)	0	13	15	11	15	7	50	20
Functional Reading (10)	10	0	0	0	0	0	0	0
Basic Comprehension (15)	87	27	60	100	100	0	100	47
Transitional Expressions (9)	11	0	56	89	100	0	100	0
Critical Comprehension (29)	31	0	31	79	41	0	76	7
Textbook/Technical Reading (18)	44	0	17	11	11	0	0	0
Reading in Content Areas (29)	17	0	10	14	14	0	28	0
Rate & Flexibility (11)	0	0	0	64	64	0	0	0
CONTENT ATTRIBUTES	**percent of attributes implemented satisfactorily**							
Accuracy (3)	100	67	100	100	100	100	100	100
Appropriateness (5)	100	80	100	100	80	100	100	80
Feedback (3)	100	100	100	33	33	33	100	100
MEETING FACULTY NEEDS	**percent of needs implemented satisfactorily**							
Ease of Implementation (6)	100	83	83	100	100	100	100	100
Adaptability (6)	100	100	67	100	100	100	100	100
Summary Information (6)	83	83	83	100	83	67	100	83
MEETING STUDENT NEEDS	**percent of needs implemented satisfactorily**							
Ease of Use (7)	57	57	43	100	100	43	57	29
Adaptability (4)	50	75	25	100	75	75	100	100
Testing (3)	33	67	0	100	33	100	67	0
Tracking (2)	100	100	100	100	100	100	100	50
Interactivity (7)	100	86	71	71	71	86	100	86
Appropriateness (18)	56	22	33	11	11	72	11	11
SOFTWARE OPERATIONS	**percent of operations implemented satisfactorily**							
Reliability (3)	100	100	100	100	100	100	100	100
Format (7)	43	43	29	43	29	43	29	29

The publisher is shown in parentheses in the list below:

R023 *Reading for Information: Level III* (WICAT)
R024 *Reading Efficiency System* (Weaver)
R025 *College Aptitude Reading Comprehension* (Queue, Inc.)
R026 *Learning 100: Reading Strategies (HA 1-20)* (EDL)
R027 *Learning 100: Reading Strategies (EA 1-20)* (EDL)
R028 *Spelling: Level III* (WICAT Systems)
R030 *ADD: Adjusting Degrees of Difficulty Series 1* (Queue, Inc.)
R031 *ADD: Adjusting Degrees of Difficulty Series 2* (Queue, Inc.)

Synthesis of Project SYNERGY Reviews for Reading

SOFTWARE ID	R032	R033	R037	R042	R045	R048	R049	R050
Reading Level (Grade Level)	11-12	9-13+	7-9	8-13+	6-10	9-13+	6-13+	4-6
# of Reviews (up to 3)	1	1	1	2	1	1	2	1
INSTRUCTIONAL MODE	**Implemented Satisfactorily? Y=yes, N=no, X=mixed**							
Drill and Practice	Y	Y	Y	X	Y	Y	Y	Y
Tutorial	–	–	Y	–	Y	Y	Y	Y
Simulation	–	–	–	–	Y	–	Y	–
Game	Y	Y	–	–	–	–	Y	Y
Comprehensive Tool	–	–	Y	–	Y	–	Y	–
Partial Tool	Y	Y	Y	N	–	–	–	–
C O V E R A G E (Numbers in parentheses represent the number of objectives/attributes.)								
TOPICS	**percent of objectives implemented satisfactorily**							
Word Learning Skills (46)	15	15	2	2	30	11	2	0
Functional Reading (10)	0	0	0	0	0	0	10	0
Basic Comprehension (15)	0	0	40	33	53	0	53	27
Transitional Expressions (9)	0	0	22	0	100	0	0	0
Critical Comprehension (29)	0	0	14	0	76	0	3	7
Textbook/Technical Reading (18)	0	0	0	0	0	0	22	0
Reading in Content Areas (29)	0	0	0	0	28	0	28	0
Rate & Flexibility (11)	0	0	0	9	0	0	64	0
CONTENT ATTRIBUTES	**percent of attributes implemented satisfactorily**							
Accuracy (3)	0	100	100	100	100	100	100	100
Appropriateness (5)	80	80	100	100	100	60	100	80
Feedback (3)	100	100	100	0	100	67	33	100
MEETING FACULTY NEEDS	**percent of needs implemented satisfactorily**							
Ease of Implementation (6)	100	100	100	83	100	100	83	100
Adaptability (6)	100	100	100	67	83	67	100	50
Summary Information (6)	67	67	83	67	100	83	67	67
MEETING STUDENT NEEDS	**percent of needs implemented satisfactorily**							
Ease of Use (7)	57	57	100	57	57	57	57	86
Adaptability (4)	50	75	75	25	50	25	75	75
Testing (3)	0	67	33	0	67	67	67	33
Tracking (2)	100	100	100	50	100	100	100	50
Interactivity (7)	86	86	86	71	100	100	57	86
Appropriateness (18)	44	44	11	11	11	72	33	33
SOFTWARE OPERATIONS	**percent of operations implemented satisfactorily**							
Reliability (3)	67	100	100	100	100	100	100	100
Format (7)	29	29	14	43	0	43	29	14

The publisher is shown in parentheses in the list below:

R032 *Word Attack: SAT Data Disk* (Davidson)
R033 *Word Attack: Roots & Prefixes* (Davidson)
R037 *Basic Reading Skills* (Projected Learning Programs, Inc.)
R042 *Comprehension Power: Level Hi-A, Lessons 1-3* (Milliken Publishing Co.)
R045 *Diascriptive Reading III* (Educational Activities, Inc.)
R048 *Intellectual SAT Vocabulary* (Queue, Inc.)
R049 *Evelyn Wood Dynamic Reader* (Timeworks)
R050 *Fundamentals of Reading* (Educational Activities, Inc.)

Synthesis of Project SYNERGY Reviews for Reading

SOFTWARE ID	R053	R062	R064	R065	R067	R069	R070	R072
Reading Level (Grade Level)	4-5	10-13+	6-8	10-12	6-10	8	2-6	9-13+
# of Reviews (up to 3)	1	1	1	1	2	1	1	1
INSTRUCTIONAL MODE	**Implemented Satisfactorily? Y=yes, N=no, X=mixed**							
Drill and Practice	Y	Y	Y	Y	Y	Y	–	Y
Tutorial	Y	–	–	–	Y	Y	Y	N
Simulation	Y	Y	–	–	–	–	–	Y
Game	Y	–	–	–	–	–	–	–
Comprehensive Tool	Y	–	–	–	–	–	Y	–
Partial Tool	–	Y	Y	Y	–	Y	–	Y
C O V E R A G E (Numbers in parentheses represent the number of objectives/attributes.)								
TOPICS	**percent of objectives implemented satisfactorily**							
Word Learning Skills (46)	0	4	0	11	15	11	0	0
Functional Reading (10)	60	0	0	0	0	0	0	0
Basic Comprehension (15)	0	0	0	20	87	53	40	0
Transitional Expressions (9)	0	0	0	0	78	67	11	0
Critical Comprehension (29)	0	10	7	48	41	0	7	0
Textbook/Technical Reading (18)	6	0	0	0	0	0	39	0
Reading in Content Areas (29)	0	0	0	0	0	0	0	0
Rate & Flexibility (11)	0	0	0	0	0	0	0	27
CONTENT ATTRIBUTES	**percent of attributes implemented satisfactorily**							
Accuracy (3)	67	100	67	67	100	100	100	100
Appropriateness (5)	100	80	80	20	100	100	100	80
Feedback (3)	100	33	100	100	100	33	100	100
MEETING FACULTY NEEDS	**percent of needs implemented satisfactorily**							
Ease of Implementation (6)	83	33	83	83	100	33	100	83
Adaptability (6)	83	100	17	17	100	50	100	100
Summary Information (6)	67	83	50	83	100	50	67	67
MEETING STUDENT NEEDS	**percent of needs implemented satisfactorily**							
Ease of Use (7)	29	71	43	43	43	29	43	57
Adaptability (4)	75	100	0	0	75	50	100	50
Testing (3)	0	0	0	0	0	0	67	0
Tracking (2)	100	100	50	50	100	100	100	50
Interactivity (7)	86	100	71	71	100	71	100	71
Appropriateness (18)	50	28	6	0	22	22	50	33
SOFTWARE OPERATIONS	**percent of operations implemented satisfactorily**							
Reliability (3)	33	100	100	100	100	100	100	67
Format (7)	14	29	29	29	29	29	43	29

The publisher is shown in parentheses in the list below:

R053 *How to Read for Everyday Living* (Educational Activities, Inc.)
R062 *Quantum* (EDL)
R064 *Reading and Thinking III* (Queue, Inc.)
R065 *Reading and Thinking IV* (Queue, Inc.)
R067 *Reading and Critical Thinking Series* (Educulture)
R069 *Ten Steps to Building College Reading Skills* (Townsend Press)
R070 *Reading IV* (WICAT Systems)
R072 *Speed Reader II* (Davidson & Associates)

Synthesis of Project SYNERGY Reviews for Reading

SOFTWARE ID	R073	R074	R075	R079	R082	R086	R087	R103
Reading Level (Grade Level)	8-13	8-13	2-3	5-6	3-6	1-2.5	2-3.5	6-10
# of Reviews (up to 3)	1	1	1	1	1	1	1	1
INSTRUCTIONAL MODE	**Implemented Satisfactorily? Y=yes, N=no, X=mixed**							
Drill and Practice	–	–	Y	Y	Y	Y	Y	Y
Tutorial	Y	Y	Y	–	–	–	–	–
Simulation	Y	Y	–	–	–	–	–	–
Game	–	–	Y	–	Y	–	–	–
Comprehensive Tool	Y	Y	–	–	–	–	–	–
Partial Tool	–	–	–	–	Y	Y	Y	–
C O V E R A G E (Numbers in parentheses represent the number of objectives/attributes.)								
TOPICS	**percent of objectives implemented satisfactorily**							
Word Learning Skills (46)	28	28	13	11	15	4	4	0
Functional Reading (10)	0	0	0	0	0	0	0	0
Basic Comprehension (15)	40	40	33	13	53	20	20	13
Transitional Expressions (9)	100	100	0	0	0	0	0	0
Critical Comprehension (29)	10	34	0	3	0	0	0	0
Textbook/Technical Reading (18)	50	50	0	6	0	0	0	0
Reading in Content Areas (29)	0	14	0	0	0	0	0	0
Rate & Flexibility (11)	0	0	36	0	0	0	0	0
CONTENT ATTRIBUTES	**percent of attributes implemented satisfactorily**							
Accuracy (3)	100	100	100	100	100	100	100	100
Appropriateness (5)	100	100	100	60	100	100	80	60
Feedback (3)	100	100	33	33	0	33	67	0
MEETING FACULTY NEEDS	**percent of needs implemented satisfactorily**							
Ease of Implementation (6)	100	100	100	83	100	100	100	50
Adaptability (6)	100	100	100	0	100	100	100	50
Summary Information (6)	67	67	67	0	83	100	83	83
MEETING STUDENT NEEDS	**percent of needs implemented satisfactorily**							
Ease of Use (7)	43	43	43	43	43	71	71	14
Adaptability (4)	75	75	75	0	75	100	100	25
Testing (3)	33	33	67	0	0	33	33	0
Tracking (2)	100	100	100	50	100	100	100	100
Interactivity (7)	100	100	100	14	57	100	100	100
Appropriateness (18)	56	56	28	11	56	28	11	11
SOFTWARE OPERATIONS	**percent of operations implemented satisfactorily**							
Reliability (3)	100	100	100	100	100	100	100	100
Format (7)	43	43	43	14	29	29	29	29

The publisher is shown in parentheses in the list below:

R073 *Science III: GED Objectives* (WICAT)
R074 *Social Studies III: GED Objectives* (WICAT)
R075 *Supplement 100: Reading Efficiency System* (Weaver Instructional Systems)
R079 *How to Read in the Content Areas* (Educational Activities, Inc.)
R082 *Read 'N Roll* (Davidson & Associates)
R086 *Learning 100: Reading Strategies* (AA 1-20) (EDL)
R087 *Learning 100: Reading Strategies* (BA 1-20) (EDL)
R103 *Reading for Enrichment: Main Idea* (Queue, Inc.)

Synthesis of Project SYNERGY Reviews for Reading

SOFTWARE ID	R105	R110	R111	R112	R116			
Reading Level (Grade Level)	6-10	9-13+	3-4	3-8	10-12			
# of Reviews (up to 3)	1	1	1	1	1			
INSTRUCTIONAL MODE	**Implemented Satisfactorily? Y=yes, N=no, X=mixed**							
Drill and Practice	Y	Y	Y	Y	N			
Tutorial	–	–	Y	Y	–			
Simulation	–	Y	–	Y	–			
Game	–	–	–	–	–			
Comprehensive Tool	–	–	Y	Y	–			
Partial Tool	–	Y	Y	Y	N			
C O V E R A G E (Numbers in parentheses represent the number of objectives/attributes.)								
TOPICS	**percent of objectives implemented satisfactorily**							
Word Learning Skills (46)	0	9	0	15	0			
Functional Reading (10)	0	0	0	0	0			
Basic Comprehension (15)	13	100	67	53	13			
Transitional Expressions (9)	0	0	89	22	0			
Critical Comprehension (29)	0	14	14	21	0			
Textbook/Technical Reading (18)	0	22	44	0	0			
Reading in Content Areas (29)	0	0	38	0	0			
Rate & Flexibility (11)	0	0	0	0	0			
CONTENT ATTRIBUTES	**percent of attributes implemented satisfactorily**							
Accuracy (3)	100	100	100	100	100			
Appropriateness (5)	60	100	100	100	80			
Feedback (3)	100	67	100	100	0			
MEETING FACULTY NEEDS	**percent of needs implemented satisfactorily**							
Ease of Implementation (6)	50	100	100	83	67			
Adaptability (6)	50	67	50	83	33			
Summary Information (6)	83	50	83	67	67			
MEETING STUDENT NEEDS	**percent of needs implemented satisfactorily**							
Ease of Use (7)	43	43	29	71	57			
Adaptability (4)	50	25	100	75	25			
Testing (3)	0	67	33	100	0			
Tracking (2)	100	100	50	100	50			
Interactivity (7)	100	71	86	100	57			
Appropriateness (18)	17	22	56	22	11			
SOFTWARE OPERATIONS	**percent of operations implemented satisfactorily**							
Reliability (3)	100	100	100	100	100			
Format (7)	43	29	43	14	14			

The publisher is shown in parentheses in the list below:

R105 *Reading for Enrichment: Finding the Facts* (Queue, Inc.)

R110 *Intellectual PSAT/SAT Reading Comprehension* (Queue, Inc.)

R111 *Reading for Information: Level II* (IBM)

R112 *Diascriptive Reading II* (Educational Activities, Inc.)

R116 *Comprehensive Power: Levels J, K, L* (Milliken Publishing Co.)

Synthesis of Project SYNERGY Reviews for Writing

SOFTWARE ID	W001	W002	W003	W004	W005	W007	W008	W009
Reading Level (Grade Level)	11	6-13+	8-13	10	8-13+	10-12	12-13+	10
# of Reviews (up to 3)	1	3	2	2	2	2	2	2
INSTRUCTIONAL MODE	**Implemented Satisfactorily? Y=yes, N=no, X=mixed**							
Drill and Practice	-	-	-	-	Y	-	-	-
Tutorial	-	Y	Y	Y	Y	-	Y	Y
Simulation	Y	-	-	-	Y	-	-	-
Game	-	-	-	-	-	-	-	-
Comprehensive Tool	-	X	Y	Y	Y	Y	-	Y
Partial Tool	-	-	Y	Y	Y	Y	Y	Y
C O V E R A G E (Numbers in parentheses represent the number of objectives/attributes.)								
TOPICS	**percent of objectives implemented satisfactorily**							
Prewiting (12)	50	33	50	50	67	33	17	42
Writing (25)	36	16	76	72	68	8	8	56
Revision (12)	42	8	67	100	100	25	0	58
Editing (25)	0	8	0	48	28	20	0	0
CONTENT ATTRIBUTES	**percent of attributes implemented satisfactorily**							
Accuracy (3)	67	100	100	100	100	100	100	100
Appropriateness (5)	80	60	100	100	100	100	100	60
Feedback (3)	0	0	100	100	100	0	100	33
MEETING FACULTY NEEDS	**percent of needs implemented satisfactorily**							
Ease of Implementation (6)	50	67	83	100	100	83	100	83
Adaptability (6)	50	83	100	100	83	83	100	67
Summary Information (6)	83	17	83	83	83	17	100	67
MEETING STUDENT NEEDS	**percent of needs implemented satisfactorily**							
Ease (7)	29	71	71	100	100	100	57	29
Adaptability (4)	50	50	100	100	75	75	100	50
Testing (3)	0	0	0	0	100	0	0	0
Tracking (2)	0	0	100	100	100	100	100	100
Interactivity (7)	57	0	86	100	100	100	100	71
Appropriateness (18)	11	17	33	33	11	33	11	11
SOFTWARE OPERATIONS	**percent of operations implemented satisfactorily**							
Reliabilty (3)	67	100	100	100	100	100	100	100
Format (7)	29	43	43	29	43	43	29	29

The publisher is shown in parentheses in the list below:

W001 *Thoughtline: The Intelligent Writer's Companion* (Xpercom)
W002 *Fine Lines* (Houghton Mifflin)
W003 *The Writing Tutor* (Harcourt Brace Jovanovich)
W004 *Writer's Helper Stage II* (Conduit)
W005 *Writing is Thinking* (Kapstrom, Inc.)
W007 *Wordbench: The Tool for People Who Write* (Addison Wesley Publishing Company, Inc.)
W008 *SEEN* (Conduit)
W009 *Prewriting* (National Collegiate Software Clearinghouse)

Synthesis of Project SYNERGY Reviews for Writing

SOFTWARE ID	W010	W011	W012	W015	W016	W017	W018	W019
Reading Level (Grade Level)	10	11	3-9	13+	8	7-8	7-8	9
# of Reviews (up to 3)	1	1	1	1	2	2	3	1
INSTRUCTIONAL MODE	**Implemented Satisfactorily? Y=yes, N=no, X=mixed**							
Drill and Practice	Y	-	N	Y	-	Y	Y	Y
Tutorial	Y	N	N	-	Y	Y	X	N
Simulation	-	-	-	-	-	Y	-	-
Game	-	-	-	-	-	-	X	-
Comprehensive Tool	-	-	-	-	Y	Y	-	-
Partial Tool	Y	Y	-	Y	Y	-	-	-
C O V E R A G E (Numbers in parentheses represent the number of objectives/attributes.)								
TOPICS	**percent of objectives implemented satisfactorily**							
Prewiting (12)	0	42	0	0	50	0	0	0
Writing (25)	0	24	16	0	24	0	0	40
Revision (12)	8	67	0	17	25	0	25	42
Editing (25)	24	0	0	36	28	32	24	80
CONTENT ATTRIBUTES	**percent of attributes implemented satisfactorily**							
Accuracy (3)	100	67	100	100	100	100	100	67
Appropriateness (5)	80	40	80	80	100	100	80	80
Feedback (3)	33	67	33	100	100	33	0	0
MEETING FACULTY NEEDS	**percent of needs implemented satisfactorily**							
Ease of Implementation (6)	100	33	100	83	100	100	83	33
Adaptability (6)	17	50	33	67	67	100	83	17
Summary Information (6)	50	67	33	50	33	67	67	0
MEETING STUDENT NEEDS	**percent of needs implemented satisfactorily**							
Ease (7)	100	0	43	57	100	43	0	14
Adaptability (4)	25	25	25	25	75	75	50	25
Testing (3)	33	0	33	33	0	67	67	0
Tracking (2)	100	0	50	50	100	100	100	0
Interactivity (7)	57	14	14	71	100	100	71	57
Appropriateness (18)	28	11	0	11	11	72	39	28
SOFTWARE OPERATIONS	**percent of operations implemented satisfactorily**							
Reliabilty (3)	100	100	100	100	100	100	100	67
Format (7)	29	29	43	29	43	43	43	29

The publisher is shown in parentheses in the list below:

W010 *Comma Sense I 1985* (Wisc-Ware)
W011 *Organize* (Wadsworth Publishing Company)
W012 *Skills Bank* (Skills Bank Corporation)
W015 *English Achievement* (Queue, Inc.)
W016 *HBJ Writer* (Harcourt Brace Jovanovich)
W017 *Punctuation Level IV* (WICAT Systems)
W018 *Combining Sentences Level IV* (WICAT Systems)
W019 *The Holt Writing Tutor* (Harcourt Brace Jovanovich)

Synthesis of Project SYNERGY Reviews for Writing

SOFTWARE ID	W021	W022	W024	W025	W026	W027	W031	W032
Reading Level (Grade Level)	10-13+	All	6-10	6-13+	11	7	9-13+	9-10
# of Reviews (up to 3)	3	1	2	2	1	1	3	2
INSTRUCTIONAL MODE	**Implemented Satisfactorily? Y=yes, N=no, X=mixed**							
Drill and Practice	-	-	Y	Y	-	Y	Y	-
Tutorial	-	-	Y	Y	-	Y	X	Y
Simulation	-	-	-	-	-	-	-	-
Game	-	-	-	-	-	-	-	-
Comprehensive Tool	-	Y	-	-	-	Y	-	Y
Partial Tool	X	-	N	Y	Y	-	Y	Y
C O V E R A G E (Numbers in parentheses represent the number of objectives/attributes.)								
TOPICS	**percent of objectives implemented satisfactorily**							
Prewiting (12)	0	0	0	42	58	0	0	42
Writing (25)	0	0	0	56	24	0	0	48
Revision (12)	0	0	0	50	50	0	0	100
Editing (25)	40	40	88	16	0	80	16	100
CONTENT ATTRIBUTES	**percent of attributes implemented satisfactorily**							
Accuracy (3)	100	100	100	100	100	100	100	100
Appropriateness (5)	60	60	100	100	100	100	60	60
Feedback (3)	33	33	100	100	0	0	0	0
MEETING FACULTY NEEDS	**percent of needs implemented satisfactorily**							
Ease of Implementation (6)	100	100	83	83	83	100	33	83
Adaptability (6)	83	50	100	67	50	83	17	83
Summary Information (6)	67	83	0	83	17	83	50	17
MEETING STUDENT NEEDS	**percent of needs implemented satisfactorily**							
Ease (7)	71	29	71	100	57	100	43	71
Adaptability (4)	25	0	100	0	75	50	25	50
Testing (3)	0	0	100	0	0	100	33	0
Tracking (2)	100	100	100	100	0	100	50	0
Interactivity (7)	71	43	100	100	43	86	43	14
Appropriateness (18)	28	22	67	56	11	33	11	56
SOFTWARE OPERATIONS	**percent of operations implemented satisfactorily**							
Reliabilty (3)	100	67	100	100	100	100	100	67
Format (7)	29	29	29	29	29	29	29	43

The publisher is shown in parentheses in the list below:

W021 *Grammatik IV* (References Software, Inc.)
W022 *Rightwriter 3.1* (Que Software)
W024 *Blue Pencil Authoring System* (Prentice Hall Press)
W025 *CAW: Computer Assisted Writing* (Educational Activities, Inc.)
W026 *The Computer Writing Resource Kit* (D.C. Heath and Company)
W027 *COMSKL-PC* (Fox Valley Technical College)
W031 *Practical Composition Series I-V* (Educulture)
W032 *Norton Textra 2.0* (W.W. Norton and Company, Inc.)

Synthesis of Project SYNERGY Reviews for Writing

SOFTWARE ID	W033	W037	W039	W040	W042	W043	W045	W046
Reading Level (Grade Level)	12	7-12	7-12	13	6-13+	8	4-10	8-10
# of Reviews (up to 3)	1	2	1	1	2	1	2	3
INSTRUCTIONAL MODE	**Implemented Satisfactorily? Y=yes, N=no, X=mixed**							
Drill and Practice	-	-	Y	-	Y	-	Y	Y
Tutorial	Y	-	Y	Y	Y	-	Y	Y
Simulation	-	-	Y	-	-	-	Y	-
Game	-	-	-	-	-	-	-	-
Comprehensive Tool	-	-	-	-	-	-	-	-
Partial Tool	-	Y	Y	Y	-	Y	-	Y
C O V E R A G E (Numbers in parentheses represent the number of objectives/attributes.)								
TOPICS	**percent of objectives implemented satisfactorily**							
Prewiting (12)	8	33	0	25	0	0	25	8
Writing (25)	0	32	0	8	0	0	24	8
Revision (12)	0	0	0	17	0	0	0	0
Editing (25)	0	0	4	0	0	4	0	0
CONTENT ATTRIBUTES	**percent of attributes implemented satisfactorily**							
Accuracy (3)	100	100	100	67	100	100	100	100
Appropriateness (5)	80	60	100	100	80	40	100	80
Feedback (3)	0	0	0	67	33	67	33	33
MEETING FACULTY NEEDS	**percent of needs implemented satisfactorily**							
Ease of Implementation (6)	83	100	67	83	33	100	100	67
Adaptability (6)	50	50	67	100	67	17	67	50
Summary Information (6)	17	17	0	17	17	17	17	33
MEETING STUDENT NEEDS	**percent of needs implemented satisfactorily**							
Ease (7)	71	57	57	29	43	100	43	43
Adaptability (4)	25	75	75	100	75	50	75	50
Testing (3)	0	0	0	0	33	0	0	0
Tracking (2)	0	0	0	0	100	50	0	100
Interactivity (7)	0	57	29	71	86	57	29	100
Appropriateness (18)	6	17	17	33	44	17	11	11
SOFTWARE OPERATIONS	**percent of operations implemented satisfactorily**							
Reliabilty (3)	100	100	100	100	100	100	100	100
Format (7)	29	29	14	43	29	43	29	43

The publisher is shown in parentheses in the list below:

W033 *College Writer* (Prentice Hall Press)
W037 *First Draft* (Scholastic, Inc.)
W039 *Mind Reader* (Brown Bag Software)
W040 *Mind Writer* (Daedalus Group, Inc.)
W042 *101 Misused Words* (Projected Learning Programs, Inc.)
W043 *PFS: Professional Write 2.1* (Scott Foresman and Company)
W045 *Proteus: The Idea Generator* (Projected Learning Programs, Inc.)
W046 *Persuasive Essay III* (Queue, Inc.)

Synthesis of Project SYNERGY Reviews for Writing

SOFTWARE ID	W050	W055	W057	W060	W061	W062	W066	W068
Reading Level (Grade Level)	11	5-8	6-10	5-6	5-8	8	8	13+
# of Reviews (up to 3)	1	3	1	2	1	1	1	1
INSTRUCTIONAL MODE	**Implemented Satisfactorily? Y=yes, N=no, X=mixed**							
Drill and Practice	-	Y	-	-	Y	Y	-	Y
Tutorial	-	X	Y	N	-	Y	-	N
Simulation	Y	-	-	N	Y	-	Y	-
Game	-	-	-	Y	-	-	-	-
Comprehensive Tool	-	-	-	-	-	-	-	-
Partial Tool	-	Y	Y	N	Y	Y	-	-
C O V E R A G E (Numbers in parentheses represent the number of objectives/attributes.)								
TOPICS	**percent of objectives implemented satisfactorily**							
Prewiting (12)	25	0	0	0	33	0	42	0
Writing (25)	32	20	0	0	44	0	4	4
Revision (12)	50	25	0	0	67	0	25	25
Editing (25)	4	24	8	12	32	20	0	16
CONTENT ATTRIBUTES	**percent of attributes implemented satisfactorily**							
Accuracy (3)	67	100	100	100	100	100	100	100
Appropriateness (5)	100	60	100	40	100	100	100	80
Feedback (3)	33	67	0	0	33	67	100	33
MEETING FACULTY NEEDS	**percent of needs implemented satisfactorily**							
Ease of Implementation (6)	50	67	83	67	67	100	83	100
Adaptability (6)	17	50	0	67	67	67	50	83
Summary Information (6)	17	33	17	17	67	67	0	83
MEETING STUDENT NEEDS	**percent of needs implemented satisfactorily**							
Ease (7)	14	43	57	57	43	100	57	43
Adaptability (4)	75	0	75	100	50	25	25	25
Testing (3)	0	0	0	0	67	33	0	67
Tracking (2)	0	0	0	0	50	100	0	50
Interactivity (7)	71	100	14	29	86	86	14	100
Appropriateness (18)	22	6	33	44	11	28	22	11
SOFTWARE OPERATIONS	**percent of operations implemented satisfactorily**							
Reliabilty (3)	67	67	100	100	100	100	100	100
Format (7)	43	29	29	29	29	29	29	43

The publisher is shown in parentheses in the list below:

W050 *Report Writing* (Compris)
W055 *Writing Skills: Learning to Write* (Queue, Inc.)
W057 *Webster's New World Writer* (Prentice Hall Press)
W060 *Snowball* (Wisc-Ware)
W061 *Writing Skills Series: Developing Writing Skills* (Queue, Inc.)
W062 *Comma Sense II* (Wisc-Ware)
W066 *Super Scoop* (Queue, Inc.)
W068 *Skills Bank II* (Skills Bank Corporation)

Synthesis of Project SYNERGY Reviews for Writing

SOFTWARE ID	W074	W075	W076	W077	W078	W080	W082	W083
Reading Level (Grade Level)	8-12	11	9-13+	6-10	7	All	12	11
# of Reviews (up to 3)	2	1	1	1	1	1	1	2
INSTRUCTIONAL MODE	**Implemented Satisfactorily? Y=yes, N=no, X=mixed**							
Drill and Practice	Y	-	N	-	Y	-	N	-
Tutorial	Y	-	N	-	Y	-	-	Y
Simulation	Y	-	-	-	-	-	-	-
Game	-	-	-	-	-	Y	-	-
Comprehensive Tool	Y	-	-	-	-	-	-	-
Partial Tool	Y	N	-	Y	-	-	-	Y
C O V E R A G E (Numbers in parentheses represent the number of objectives/attributes.)								
TOPICS	**percent of objectives implemented satisfactorily**							
Prewiting (12)	0	0	0	58	0	17	0	8
Writing (25)	0	0	8	32	0	72	0	20
Revision (12)	0	0	0	42	0	58	0	58
Editing (25)	32	20	68	0	32	68	64	96
CONTENT ATTRIBUTES	**percent of attributes implemented satisfactorily**							
Accuracy (3)	100	67	33	67	100	100	0	100
Appropriateness (5)	100	100	80	80	100	100	60	60
Feedback (3)	100	67	33	67	0	33	0	33
MEETING FACULTY NEEDS	**percent of needs implemented satisfactorily**							
Ease of Implementation (6)	100	83	67	67	67	67	50	83
Adaptability (6)	100	100	50	83	83	100	33	67
Summary Information (6)	100	67	50	100	100	0	67	67
MEETING STUDENT NEEDS	**percent of needs implemented satisfactorily**							
Ease (7)	100	43	29	71	43	43	43	57
Adaptability (4)	75	100	50	50	25	25	0	25
Testing (3)	0	0	67	0	0	0	0	33
Tracking (2)	50	50	0	0	50	50	50	50
Interactivity (7)	71	71	71	29	57	71	0	14
Appropriateness (18)	78	33	11	28	28	44	6	33
SOFTWARE OPERATIONS	**percent of operations implemented satisfactorily**							
Reliabilty (3)	100	100	100	100	100	100	67	100
Format (7)	57	43	29	29	29	29	43	29

The publisher is shown in parentheses in the list below:

W074 *Ami Professional* (Samna Corporation)
W075 *PC Proof* (Lexpertise Linguistic Software)
W076 *Parlance* (Parlance Software)
W077 *Maxthink 89* (Maxthink, Inc.)
W078 *Mark-Up: A Punctuation Tool* (Research Design Associates, Inc.)
W080 *Tanglers* (Research Design Associates, Inc.)
W082 *Grammar...What Big Teeth You Have!* (Krell Software, Inc.)
W083 *Edit!* (McGraw-Hill)

Synthesis of Project SYNERGY Reviews for Writing

SOFTWARE ID	W084	W087	W091	W092	W093	W094		
Reading Level (Grade Level)	3-6	10	6-10	8	10	10		
# of Reviews (up to 3)	1	1	1	1	1	1		
INSTRUCTIONAL MODE	**Implemented Satisfactorily? Y=yes, N=no, X=mixed**							
Drill and Practice	N	-	Y	Y	-	-		
Tutorial	N	Y	Y	Y	Y	Y		
Simulation	-	-	-	-	-	-		
Game	Y	-	-	-	-	-		
Comprehensive Tool	-	-	-	-	-	-		
Partial Tool	-	Y	Y	Y	Y	-		
C O V E R A G E (Numbers in parentheses represent the number of objectives/attributes.)								
TOPICS	**percent of objectives implemented satisfactorily**							
Prewiting (12)	0	42	0	0	0	0		
Writing (25)	0	48	8	36	0	0		
Revision (12)	0	0	8	75	0	25		
Editing (25)	4	0	12	44	4	72		
CONTENT ATTRIBUTES	**percent of attributes implemented satisfactorily**							
Accuracy (3)	100	100	100	67	100	100		
Appropriateness (5)	60	100	40	60	20	60		
Feedback (3)	33	67	67	67	0	67		
MEETING FACULTY NEEDS	**percent of needs implemented satisfactorily**							
Ease of Implementation (6)	67	67	67	67	33	67		
Adaptability (6)	50	67	50	50	50	67		
Summary Information (6)	67	17	17	17	17	83		
MEETING STUDENT NEEDS	**percent of needs implemented satisfactorily**							
Ease (7)	29	71	43	43	43	71		
Adaptability (4)	25	100	0	0	25	0		
Testing (3)	67	0	0	0	0	0		
Tracking (2)	50	100	50	50	0	0		
Interactivity (7)	14	43	100	100	14	0		
Appropriateness (18)	17	22	6	6	22	6		
SOFTWARE OPERATIONS	**percent of operations implemented satisfactorily**							
Reliabilty (3)	100	100	100	100	100	100		
Format (7)	29	43	29	29	29	29		

The publisher is shown in parentheses in the list below:

W084 *Grammar Gremlins* (Davidson & Associates)
W087 *Prewriter* (Prentice Hall Press)
W091 *Vocabulary Series* (Queue, Inc.)
W092 *Developing Writing Skills* (Queue, Inc.)
W093 *Bank Street Writer* (Scholastic, Inc.)
W094 *Editor* (TASL)

Synthesis of Project SYNERGY Reviews for Math

SOFTWARE ID	M001	M002	M003	M004	M005	M006	M008	M009	M010
# of Reviews (up to 3)	3	3	2	1	1	2	3	3	1
INSTRUCTIONAL MODE	**Implemented Satisfactorily? Y=yes, N=no, X=mixed**								
Drill and Practice	Y	X	Y	Y	Y	Y	Y	Y	Y
Tutorial	–	–	Y	Y	Y	Y	–	Y	Y
Simulation	–	–	–	Y	Y	–	–	–	Y
Game	–	–	–	Y	–	–	–	–	–
Comprehensive Tool	–	–	–	Y	Y	Y	–	–	–
Partial Tool	–	–	–	Y	Y	Y	Y	Y	Y
C O V E R A G E	**(Numbers in parentheses represent the number of objectives/attributes.)**								
TOPICS	**percent of objectives implemented satisfactorily**								
Base Ten Notation (8)	25	0	0	62	38	100	0	0	25
Basic Ops/Whole Numbers (10)	50	0	0	50	50	100	0	0	30
Prime Numbers & Factorization (4)	25	0	0	25	100	100	0	0	75
Basic Ops/Positive Fractions (19)	63	0	0	79	21	100	32	0	74
Basic Ops/ Positive Decimals (13)	15	0	0	69	46	100	0	0	0
Ratio and Proportions (6)	0	0	0	83	100	100	0	0	0
Percents (7)	86	0	0	100	71	100	29	0	0
Units of Measure (10)	0	0	0	100	0	100	0	0	0
Basic Geometry (41)	0	0	0	98	0	59	0	0	39
Basic Ops/Signed Numbers (10)	0	60	0	80	90	100	60	0	100
Real Numbers (25)	16	32	12	44	96	84	32	32	88
Set Notation (7)	0	0	0	0	0	0	0	0	57
Simple Linear Eq./One Variable (7)	43	43	57	57	71	86	100	71	86
Simple Linear Ineq./One Variable (6)	0	0	83	67	83	50	83	67	100
Integer Exponents (9)	22	44	44	78	89	78	56	0	56
Polynomials (18)	0	33	22	11	83	11	22	44	67
Factoring (6)	0	17	67	0	67	33	83	0	83
Graphs (21)	0	38	76	38	95	0	43	76	5
Solving Systems of Equations (9)	0	22	56	0	100	0	67	78	0
Quadratics (9)	0	33	78	0	89	0	56	0	44
Rational Expressions (5)	0	80	80	0	60	0	80	0	0
Rational Exponents & Radicals (9)	0	44	56	0	44	0	33	0	0
Geometry (7)	0	0	0	86	14	0	0	0	14
CONTENT ATTRIBUTES	**percent of attributes implemented satisfactorily**								
Accuracy (3)	100	100	100	100	67	100	100	100	67
Appropriateness (5)	80	80	100	100	100	100	100	100	80
Feedback (3)	0	33	33	33	100	100	100	33	100
MEETING FACULTY NEEDS	**percent of needs implemented satisfactorily**								
Ease of Implementation (6)	100	100	100	100	83	100	83	83	100
Adaptability (6)	83	100	100	100	83	100	67	100	100
Summary Information (6)	50	100	100	83	83	100	33	83	33
MEETING STUDENT NEEDS	**percent of needs implemented satisfactorily**								
Ease of Use (7)	43	43	71	71	29	43	43	29	100
Adaptability (4)	75	50	75	75	25	100	75	75	75
Testing (3)	0	0	0	100	67	100	0	0	33
Tracking (2)	50	50	50	100	50	100	100	100	0
Interactivity (7)	71	100	100	86	43	100	100	100	57
Appropriateness (18)	11	33	33	61	33	33	50	56	94
SOFTWARE OPERATIONS	**percent of operations implemented satisfactorily**								
Reliabilty (3)	100	67	100	100	33	100	100	100	100
Format (7)	29	43	43	43	43	43	29	43	43

The publisher is shown in parentheses in the list below:

M001 *Pre-Algebra/The Math Lab* (The Math Lab)
M002 *Beginning Algebra/The Math Lab* (The Math Lab)
M003 *Intermediate Algebra/The Math Lab* (The Math Lab)
M004 *Math III* (WICAT Systems)
M005 *Algebra* (WICAT Systems)
M006 *Individual Skills Bank II* (Skills Bank Corporation)
M008 *Algebra Drill and Practice I,II,III* (Conduit)
M009 *Algebra I: Part I* (IBM)
M010 *First Year Algebra Part I* (Conduit)

Synthesis of Project SYNERGY Reviews for Math

SOFTWARE ID	M011	M014	M015	M016	M018	M019	M020	M021	M022
# of Reviews (up to 3)	1	1	1	1	2	3	3	2	1
INSTRUCTIONAL MODE	**Implemented Satisfactorily? Y=yes, N=no, X=mixed**								
Drill and Practice	Y	Y	Y	Y	X	X	Y	X	–
Tutorial	Y	Y	–	Y	X	–	X	N	–
Simulation	–	Y	–	–	–	X	–	–	–
Game	–	Y	Y	–	–	–	–	–	Y
Comprehensive Tool	–	–	–	–	Y	–	–	–	–
Partial Tool	–	Y	Y	Y	Y	X	Y	–	Y
C O V E R A G E	**(Numbers in parentheses represent the number of objectives/attributes.)**								
TOPICS	**percent of objectives implemented satisfactorily**								
Base Ten Notation (8)	0	38	0	0	100	0	0	0	–
Basic Ops/Whole Numbers (10)	40	50	40	0	100	0	0	0	–
Prime Numbers & Factorization (4)	0	0	0	0	100	0	0	0	–
Basic Ops/Positive Fractions (19)	47	74	32	0	74	16	0	0	–
Basic Ops/ Positive Decimals (13)	62	69	31	0	69	0	0	0	–
Ratio and Proportions (6)	0	100	0	100	83	0	0	0	–
Percents (7)	0	86	0	0	71	0	0	0	–
Units of Measure (10)	10	0	0	0	100	0	0	0	–
Basic Geometry (41)	0	63	0	20	49	0	0	0	–
Basic Ops/Signed Numbers (10)	0	10	0	50	40	0	60	10	–
Real Numbers (25)	16	32	0	0	20	0	16	40	–
Set Notation (7)	0	0	0	0	0	0	0	0	–
Simple Linear Eq./One Variable (7)	0	29	0	29	57	0	57	57	–
Simple Linear Ineq./One Variable (6)	0	17	0	0	0	0	33	0	–
Integer Exponents (9)	0	0	0	0	56	0	44	0	–
Polynomials (18)	0	0	0	11	0	0	17	0	–
Factoring (6)	0	0	0	0	0	0	67	0	–
Graphs (21)	0	24	0	81	24	10	5	0	–
Solving Systems of Equations (9)	0	0	0	67	0	0	22	0	–
Quadratics (9)	0	0	0	78	0	11	44	0	–
Rational Expressions (5)	0	0	0	40	0	0	60	0	–
Rational Exponents & Radicals (9)	0	0	0	44	0	0	44	0	–
Geometry (7)	0	43	0	14	29	0	0	0	–
CONTENT ATTRIBUTES	**percent of attributes implemented satisfactorily**								
Accuracy (3)	67	100	100	100	100	100	100	67	100
Appropriateness (5)	80	80	80	80	100	80	60	40	80
Feedback (3)	33	0	0	100	67	0	33	67	0
MEETING FACULTY NEEDS	**percent of needs implemented satisfactorily**								
Ease of Implementation (6)	100	100	83	100	100	50	67	67	67
Adaptability (6)	50	83	100	100	100	83	67	83	67
Summary Information (6)	67	67	67	33	67	0	83	83	0
MEETING STUDENT NEEDS	**percent of needs implemented satisfactorily**								
Ease of Use (7)	29	57	29	100	71	57	29	29	29
Adaptability (4)	50	50	75	75	100	50	75	0	50
Testing (3)	67	33	0	33	33	0	0	33	0
Tracking (2)	50	100	100	0	100	0	100	50	100
Interactivity (7)	71	86	86	57	100	0	86	71	86
Appropriateness (18)	17	56	33	78	94	50	17	22	39
SOFTWARE OPERATIONS	**percent of operations implemented satisfactorily**								
Reliabilty (3)	0	67	100	100	100	100	0	33	33
Format (7)	43	43	43	43	43	29	43	29	29

The publisher is shown in parentheses in the list below:

M011 *BLS 100M Tutorcourse* (BLS)
M014 *Math Concepts Level IV* (WICAT Systems)
M015 *Math Practice Level IV* (WICAT Systems)
M016 *First Year Algebra Part II* (Conduit)
M018 *Computer Drill and Instruction* (SRA Thinkware Products)
M019 *Algebra - The Kemeny/Kurtz Math Series* (True Basic, Inc.)
M020 *Expert Algebra Tutor* (Tusoft)
M021 *Integers and Equations Parts I & II* (Hartley Courseware)
M022 *King's Rule, the J. Mathematics and Discovery* (Sunburst Communications) (This is a hypothesis-testing package that does not cover any of the topics in this table.)

Synthesis of Project SYNERGY Reviews for Math

SOFTWARE ID	M023	M025	M026	M027	M030	M031	M032	M033	M034
# of Reviews (up to 3)	2	1	3	2	1	3	1	3	1
INSTRUCTIONAL MODE	**Implemented Satisfactorily? Y=yes, N=no, X=mixed**								
Drill and Practice	Y	Y	Y	Y	Y	Y	Y	–	–
Tutorial	Y	Y	Y	Y	Y	Y	Y	–	N
Simulation	Y	Y	–	–	–	–	–	Y	–
Game	Y	–	Y	Y	–	–	–	Y	–
Comprehensive Tool	Y	–	Y	Y	Y	–	–	–	–
Partial Tool	Y	Y	Y	Y	–	–	–	–	N
C O V E R A G E	**(Numbers in parentheses represent the number of objectives/attributes.)**								
TOPICS	**percent of objectives implemented satisfactorily**								
Base Ten Notation (8)	0	0	0	0	0	0	0	0	0
Basic Ops/Whole Numbers (10)	0	0	0	0	0	0	0	0	10
Prime Numbers & Factorization (4)	0	0	0	0	0	0	0	50	0
Basic Ops/Positive Fractions (19)	0	0	0	0	0	0	0	16	0
Basic Ops/ Positive Decimals (13)	0	0	0	0	0	0	0	23	0
Ratio and Proportions (6)	0	0	0	0	0	0	0	0	0
Percents (7)	0	0	0	0	0	0	0	0	0
Units of Measure (10)	0	0	0	0	0	0	0	0	0
Basic Geometry (41)	0	0	0	0	0	0	0	5	0
Basic Ops/Signed Numbers (10)	60	0	0	60	0	0	0	0	0
Real Numbers (25)	36	0	28	72	0	72	0	0	0
Set Notation (7)	0	0	0	0	0	0	0	0	0
Simple Linear Eq./One Variable (7)	43	71	43	86	0	71	43	29	0
Simple Linear Ineq./One Variable (6)	0	0	0	83	0	0	0	0	0
Integer Exponents (9)	0	0	33	0	0	33	0	0	0
Polynomials (18)	0	0	28	17	0	83	11	0	0
Factoring (6)	0	0	50	0	0	100	50	0	0
Graphs (21)	43	67	33	5	81	38	0	0	0
Solving Systems of Equations (9)	0	67	44	0	78	0	56	22	0
Quadratics (9)	0	89	56	0	0	67	44	0	0
Rational Expressions (5)	0	60	60	0	0	100	0	0	0
Rational Exponents & Radicals (9)	0	33	0	0	0	0	0	0	0
Geometry (7)	0	14	0	0	0	0	0	0	0
CONTENT ATTRIBUTES	**percent of attributes implemented satisfactorily**								
Accuracy (3)	100	100	100	100	100	100	100	100	100
Appropriateness (5)	100	100	80	100	100	80	100	100	100
Feedback (3)	100	33	33	33	0	33	100	0	100
MEETING FACULTY NEEDS	**percent of needs implemented satisfactorily**								
Ease of Implementation (6)	100	83	100	100	83	100	100	83	83
Adaptability (6)	100	67	100	67	50	83	100	33	67
Summary Information (6)	83	83	83	83	50	83	50	0	0
MEETING STUDENT NEEDS	**percent of needs implemented satisfactorily**								
Ease of Use (7)	57	29	43	43	43	71	100	86	43
Adaptability (4)	75	25	25	100	75	75	100	25	50
Testing (3)	67	33	0	100	33	0	100	0	67
Tracking (2)	100	100	50	100	100	100	100	50	100
Interactivity (7)	100	57	71	100	71	100	100	71	71
Appropriateness (18)	39	56	78	33	11	33	33	50	22
SOFTWARE OPERATIONS	**percent of operations implemented satisfactorily**								
Reliabilty (3)	100	100	100	100	100	100	100	100	100
Format (7)	29	43	29	29	29	43	100	29	29

The publisher is shown in parentheses in the list below:

M023 *Microcomputer Curriculum Project Pre-Algebra Vols. I & II* (Price Laboratory School)

M025 *Algebra II: Part I* (IBM)

M026 *Alge-Blaster Plus* (Davidson & Associates)

M027 *Microcomputer Curriculum Project Algebra I* (Price Laboratory School)

M030 *Microcomputer Curriculum Project Algebra I Vol 2* (Price Laboratory School)

M031 *Algebra Mentor* (Brooks and Cole)

M032 *Algebra Series* (5 of 7 disks) (Queue, Inc.)

M033 *Algebra Shop* (Scholastic, Inc.)

M034 *Algebra: Equation Solving Skills* (Educational Design, Inc.)

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Synthesis of Project SYNERGY Reviews for Math

SOFTWARE ID	M035	M036	M037	M039	M041	M043	M047	M050	M051
# of Reviews (up to 3)	1	1	1	1	1	1	2	2	1
INSTRUCTIONAL MODE	**Implemented Satisfactorily? Y=yes, N=no, X=mixed**								
Drill and Practice	–	N	–	Y	Y	N	Y	Y	Y
Tutorial	Y	N	–	Y	Y	N	–	Y	Y
Simulation	–	–	–	–	–	–	–	Y	Y
Game	–	–	–	–	–	–	Y	Y	–
Comprehensive Tool	–	–	Y	Y	–	–	–	Y	Y
Partial Tool	–	–	Y	Y	Y	–	Y	X	–
C O V E R A G E	**(Numbers in parentheses represent the number of objectives/attributes.)**								
TOPICS	**percent of objectives implemented satisfactorily**								
Base Ten Notation (8)	75	0	0	0	0	–	0	0	0
Basic Ops/Whole Numbers (10)	100	0	50	60	0	–	0	0	0
Prime Numbers & Factorization (4)	0	0	75	50	0	–	0	0	0
Basic Ops/Positive Fractions (19)	74	0	47	74	68	–	0	0	0
Basic Ops/ Positive Decimals (13)	69	0	62	69	0	–	0	0	0
Ratio and Proportions (6)	33	67	17	17	0	–	0	33	0
Percents (7)	100	0	43	86	0	–	0	0	0
Units of Measure (10)	90	20	0	0	0	–	0	0	0
Basic Geometry (41)	54	10	0	0	0	–	0	93	0
Basic Ops/Signed Numbers (10)	20	0	70	80	0	–	0	0	0
Real Numbers (25)	0	0	16	24	0	–	0	0	64
Set Notation (7)	0	0	0	0	0	–	0	0	0
Simple Linear Eq./One Variable (7)	0	86	71	43	0	–	0	0	86
Simple Linear Ineq./One Variable (6)	0	33	33	0	0	–	0	0	67
Integer Exponents (9)	0	56	67	0	0	–	0	0	100
Polynomials (18)	0	11	50	11	0	–	0	0	100
Factoring (6)	0	50	67	0	0	–	0	0	83
Graphs (21)	0	0	19	0	0	–	38	0	95
Solving Systems of Equations (9)	0	33	11	0	0	–	0	0	78
Quadratics (9)	0	33	33	0	0	–	22	0	100
Rational Expressions (5)	0	0	100	0	0	–	0	0	100
Rational Exponents & Radicals (9)	0	22	78	0	0	–	0	0	56
Geometry (7)	0	0	0	0	0	–	0	86	0
CONTENT ATTRIBUTES	**percent of attributes implemented satisfactorily**								
Accuracy (3)	100	67	100	67	100	67	100	67	100
Appropriateness (5)	80	60	80	60	80	60	80	100	100
Feedback (3)	100	0	0	33	33	33	0	100	33
MEETING FACULTY NEEDS	**percent of needs implemented satisfactorily**								
Ease of Implementation (6)	100	67	50	67	33	50	100	100	100
Adaptability (6)	50	83	100	50	100	100	100	100	100
Summary Information (6)	67	83	0	83	17	0	50	100	50
MEETING STUDENT NEEDS	**percent of needs implemented satisfactorily**								
Ease of Use (7)	43	14	57	29	43	43	86	71	43
Adaptability (4)	0	50	50	75	0	75	50	75	100
Testing (3)	33	33	0	0	0	0	0	33	0
Tracking (2)	100	50	0	0	100	100	50	100	100
Interactivity (7)	57	29	14	86	86	71	57	86	100
Appropriateness (18)	78	6	72	33	17	22	67	56	78
SOFTWARE OPERATIONS	**percent of operations implemented satisfactorily**								
Reliabilty (3)	100	100	67	0	100	100	100	100	100
Format (7)	29	29	29	29	71	29	29	43	43

The publisher is shown in parentheses in the list below:

M035 *BLS Tutor Courseware-400M* (BLS)
M036 *Concepts in Algebra* (Queue, Inc.)
M037 *Derive* (Soft Warehouse, Inc.)
M039 *Expert Tutor for Arithmetic* (Tusoft)
M041 *Fraction Series* (Queue, Inc.)
M043 *Fundamentals of Math* (Queue, Inc.) (This is a testing package that does not cover any of the topics in this table.)
M047 *Green Globs and Graphing Equations* (Sunburst Communications)
M050 *Geometry One: Foundations* (WICAT Systems)
M051 *IBM Personal Computer Algebra Series* (WICAT Systems)

Table 3.4

Synthesis of Project SYNERGY Reviews for Math

SOFTWARE ID	M053	M057	M059	M060	M064	M065	M066	M068	M071
# of Reviews (up to 3)	1	2	1	1	1	1	1	1	1
INSTRUCTIONAL MODE	**Implemented Satisfactorily? Y=yes, N=no, X=mixed**								
Drill and Practice	Y	Y	–	Y	Y	Y	Y	Y	–
Tutorial	Y	Y	–	Y	Y	Y	N	Y	–
Simulation	Y	–	–	–	Y	Y	Y	–	–
Game	–	–	–	–	Y	–	Y	–	–
Comprehensive Tool	–	–	Y	–	Y	–	–	–	–
Partial Tool	Y	Y	Y	–	Y	Y	N	–	Y
C O V E R A G E	**(Numbers in parentheses represent the number of objectives/attributes.)**								
TOPICS	**percent of objectives implemented satisfactorily**								
Base Ten Notation (8)	50	25	0	88	0	0	0	12	0
Basic Ops/Whole Numbers (10)	10	40	60	60	0	0	0	10	0
Prime Numbers & Factorization (4)	0	0	75	100	0	0	0	0	0
Basic Ops/Positive Fractions (19)	89	63	47	53	0	11	26	11	0
Basic Ops/ Positive Decimals (13)	77	38	54	62	0	0	15	0	0
Ratio and Proportions (6)	100	0	17	83	0	33	50	100	0
Percents (7)	100	86	0	100	0	14	57	0	0
Units of Measure (10)	0	0	0	0	0	60	0	0	0
Basic Geometry (41)	68	0	0	0	0	49	46	0	0
Basic Ops/Signed Numbers (10)	70	0	70	80	20	50	0	0	0
Real Numbers (25)	0	12	16	0	20	28	0	0	0
Set Notation (7)	0	0	0	0	0	0	0	0	0
Simple Linear Eq./One Variable (7)	0	43	43	0	0	0	0	0	0
Simple Linear Ineq./One Variable (6)	0	0	0	0	0	0	0	0	0
Integer Exponents (9)	0	11	56	0	0	67	0	44	0
Polynomials (18)	0	22	50	0	0	0	0	0	0
Factoring (6)	0	50	67	0	0	0	0	0	0
Graphs (21)	0	29	57	0	29	14	0	0	52
Solving Systems of Equations (9)	0	11	44	0	0	0	0	0	11
Quadratics (9)	0	22	44	0	0	0	0	0	11
Rational Expressions (5)	0	0	100	0	0	0	0	0	0
Rational Exponents & Radicals (9)	0	0	78	0	0	0	0	78	0
Geometry (7)	0	0	0	0	0	43	0	0	0
CONTENT ATTRIBUTES	**percent of attributes implemented satisfactorily**								
Accuracy (3)	100	100	100	100	100	100	67	100	100
Appropriateness (5)	100	80	80	100	100	40	100	100	80
Feedback (3)	33	33	0	33	100	100	0	100	0
MEETING FACULTY NEEDS	**percent of needs implemented satisfactorily**								
Ease of Implementation (6)	83	33	67	33	50	83	50	67	83
Adaptability (6)	100	100	100	83	50	83	50	50	83
Summary Information (6)	83	17	67	50	67	100	67	0	17
MEETING STUDENT NEEDS	**percent of needs implemented satisfactorily**								
Ease of Use (7)	57	29	43	100	29	43	14	43	86
Adaptability (4)	50	75	50	50	25	50	25	75	50
Testing (3)	0	0	0	100	33	33	33	67	0
Tracking (2)	100	100	50	100	50	100	50	50	0
Interactivity (7)	100	71	57	100	86	57	57	86	29
Appropriateness (18)	72	11	56	83	44	44	61	17	56
SOFTWARE OPERATIONS	**percent of operations implemented satisfactorily**								
Reliabilty (3)	100	100	100	100	100	100	67	100	67
Format (7)	29	29	43	86	14	29	14	43	29

The publisher is shown in parentheses in the list below:

M053 *IBM Math Concepts Level IV* (IBM)
M057 *Math Practice and Problem Solver* (H & N Software)
M059 *Mathematics Exploration Tool Kit* (IBM)
M060 *Modumath* (VTAE)
M064 *Pre-Algebra* (Price Laboratory School)
M065 *Preparing for Geometry and Algebra* (IBM)
M066 *Principles of Mathematics* (Price Laboratory School)
M068 *Special Topics in Mathematics Series* (Queue, Inc.)
M071 *Pre-Calculus - Kemeny/Kurtz Math Series* (True Basic, Inc.)

Synthesis of Project SYNERGY Reviews for Math

SOFTWARE ID	M073	M075	M087	M088	M090	M091	M092	M093	M096
# of Reviews (up to 3)	1	1	2	1	1	1	2	1	1
INSTRUCTIONAL MODE	**Implemented Satisfactorily? Y=yes, N=no, X=mixed**								
Drill and Practice	Y	N	Y	Y	Y	N	N	Y	Y
Tutorial	Y	N	Y	Y	Y	Y	–	Y	Y
Simulation	Y	Y	–	–	–	–	X	–	–
Game	Y	–	–	–	–	Y	Y	–	–
Comprehensive Tool	Y	–	–	–	–	–	–	–	–
Partial Tool	Y	Y	Y	–	Y	Y	Y	Y	Y
C O V E R A G E	**(Numbers in parentheses represent the number of objectives/attributes.)**								
TOPICS	**percent of objectives implemented satisfactorily**								
Base Ten Notation (8)	12	0	0	0	0	0	38	0	0
Basic Ops/Whole Numbers (10)	60	0	0	0	0	0	70	0	0
Prime Numbers & Factorization (4)	100	0	0	0	0	0	50	0	0
Basic Ops/Positive Fractions (19)	68	0	0	0	0	0	26	0	0
Basic Ops/ Positive Decimals (13)	62	0	0	0	0	0	0	0	0
Ratio and Proportions (6)	83	50	0	0	0	0	0	0	0
Percents (7)	86	0	0	0	0	0	0	0	0
Units of Measure (10)	100	0	0	0	0	0	0	0	0
Basic Geometry (41)	22	54	0	100	56	0	95	0	0
Basic Ops/Signed Numbers (10)	60	0	0	0	0	0	0	0	0
Real Numbers (25)	0	0	0	0	0	0	0	64	0
Set Notation (7)	0	0	0	0	0	0	0	29	0
Simple Linear Eq./One Variable (7)	0	0	14	0	0	14	0	100	0
Simple Linear Ineq./One Variable (6)	0	0	0	0	0	0	0	100	0
Integer Exponents (9)	0	0	0	0	0	11	0	100	56
Polynomials (18)	0	0	0	0	0	28	0	83	33
Factoring (6)	0	0	0	0	0	17	0	100	83
Graphs (21)	0	52	0	0	38	38	0	95	0
Solving Systems of Equations (9)	0	0	0	0	0	0	0	89	0
Quadratics (9)	0	0	0	0	0	33	0	100	44
Rational Expressions (5)	0	0	0	0	0	0	0	100	0
Rational Exponents & Radicals (9)	0	0	0	0	0	0	0	100	0
Geometry (7)	0	71	0	0	43	0	0	14	0
CONTENT ATTRIBUTES	**percent of attributes implemented satisfactorily**								
Accuracy (3)	100	67	100	100	67	100	100	100	100
Appropriateness (5)	100	40	80	80	40	80	100	100	40
Feedback (3)	67	0	33	33	100	33	100	67	33
MEETING FACULTY NEEDS	**percent of needs implemented satisfactorily**								
Ease of Implementation (6)	100	83	100	100	100	83	100	100	83
Adaptability (6)	100	83	67	67	83	50	100	100	67
Summary Information (6)	67	100	83	83	83	83	0	67	67
MEETING STUDENT NEEDS	**percent of needs implemented satisfactorily**								
Ease of Use (7)	43	29	71	29	43	57	100	71	43
Adaptability (4)	75	50	25	0	50	50	50	100	75
Testing (3)	67	33	0	0	67	33	0	67	67
Tracking (2)	100	100	100	0	50	100	50	100	0
Interactivity (7)	86	57	100	29	100	71	100	100	71
Appropriateness (18)	100	72	39	33	11	44	67	56	6
SOFTWARE OPERATIONS	**percent of operations implemented satisfactorily**								
Reliabilty (3)	67	67	100	100	100	100	100	100	100
Format (7)	86	43	29	29	29	43	29	43	29

The publisher is shown in parentheses in the list below:

M073 *Interactive Mathematics* (Ferranti Educational Systems, Inc.)
M075 *Geometry Two: Proofs and Extensions* (IBM)
M087 *Applied Problem Solving* (Educational Activities, Inc.)
M088 *Geometry Alive* (Educational Activities, Inc.)
M090 *Microcomputer Curriculum Project Geometry* (Price Laboratory School)
M091 *Algebra Concepts* (Ventura Educational Systems)
M092 *Hands-On Math* (Ventura Educational Systems)
M093 *Computer Tutor for Intermediate Algebra: An Applied Approach* (Houghton Mifflin)
M096 *Microcomputer Curriculum Project Algebra I Vol 3* (Price Laboratory School)

Synthesis of Project SYNERGY Reviews for Math

SOFTWARE ID	M098	M099	M100	M103	M104	M106	M107	M115	M116
# of Reviews (up to 3)	1	1	1	2	1	1	1	1	1
INSTRUCTIONAL MODE	Implemented Satisfactorily? Y=yes, N=no, X=mixed								
Drill and Practice	Y	Y	Y	Y	Y	Y	Y	Y	Y
Tutorial	Y	Y	Y	Y	Y	Y	–	Y	Y
Simulation	–	–	–	Y	–	Y	–	–	–
Game	–	–	–	–	–	–	–	–	–
Comprehensive Tool	Y	–	–	Y	–	–	–	–	–
Partial Tool	Y	–	–	Y	–	Y	Y	Y	–
C O V E R A G E	(Numbers in parentheses represent the number of objectives/attributes.)								
TOPICS	percent of objectives implemented satisfactorily								
Base Ten Notation (8)	0	0	38	0	0	0	50	0	100
Basic Ops/Whole Numbers (10)	0	0	60	0	40	0	60	0	90
Prime Numbers & Factorization (4)	0	0	0	0	75	0	0	0	100
Basic Ops/Positive Fractions (19)	0	0	63	0	11	0	37	0	79
Basic Ops/ Positive Decimals (13)	0	0	38	0	0	0	62	0	77
Ratio and Proportions (6)	0	0	50	0	0	0	33	0	83
Percents (7)	0	0	71	0	0	0	0	0	86
Units of Measure (10)	0	0	0	0	0	0	0	0	100
Basic Geometry (41)	0	0	0	0	0	0	0	0	37
Basic Ops/Signed Numbers (10)	0	0	40	80	10	0	60	0	100
Real Numbers (25)	96	0	56	100	0	0	52	12	40
Set Notation (7)	0	0	0	0	0	0	0	0	0
Simple Linear Eq./One Variable (7)	86	0	86	86	43	0	86	0	0
Simple Linear Ineq./One Variable (6)	100	0	0	67	0	0	0	0	0
Integer Exponents (9)	0	0	100	100	0	0	44	100	44
Polynomials (18)	72	28	83	100	0	0	6	28	0
Factoring (6)	33	67	83	83	0	0	0	50	0
Graphs (21)	5	52	48	86	0	67	14	19	19
Solving Systems of Equations (9)	0	56	44	67	0	0	44	56	0
Quadratics (9)	0	89	67	67	0	11	11	78	0
Rational Expressions (5)	0	0	100	100	0	0	0	0	0
Rational Exponents & Radicals (9)	0	78	11	78	0	0	0	67	0
Geometry (7)	0	0	0	0	0	0	0	0	29
CONTENT ATTRIBUTES	percent of attributes implemented satisfactorily								
Accuracy (3)	100	100	100	100	100	100	100	100	100
Appropriateness (5)	100	100	60	100	100	80	80	80	100
Feedback (3)	100	0	0	33	0	33	0	33	100
MEETING FACULTY NEEDS	percent of needs implemented satisfactorily								
Ease of Implementation (6)	83	100	50	83	33	100	83	100	100
Adaptability (6)	67	50	33	67	33	100	100	83	67
Summary Information (6)	0	17	17	67	0	33	17	83	0
MEETING STUDENT NEEDS	percent of needs implemented satisfactorily								
Ease of Use (7)	100	71	43	43	29	86	100	43	71
Adaptability (4)	75	25	25	25	25	75	100	75	25
Testing (3)	33	33	33	0	0	0	100	67	0
Tracking (2)	100	50	50	50	100	50	50	100	100
Interactivity (7)	100	86	86	100	100	71	71	100	100
Appropriateness (18)	61	56	33	61	11	56	56	11	56
SOFTWARE OPERATIONS	percent of operations implemented satisfactorily								
Reliabilty (3)	100	100	100	100	100	100	100	100	100
Format (7)	43	29	29	29	29	43	43	29	29

The publisher is shown in parentheses in the list below:

M098 *Algebra 1: First Semester* (Britannica Software)
M099 *Algebra 1: Second Semester* (Britannica Software)
M100 *The Math Lab: Pre-, Beginning, and Intermediate Algebra* (Addison Wesley Publishing Company, Inc.)
M103 *Professor Weissman's Software: Algebrax* (Professor Weissman's Software)
M104 *Topics in Algebra* (H & H Publishers)
M106 *The Function Analyzer* (Sunburst Communications)
M107 *PC Solve* (Pacific Crest Software)
M115 *Microcomputer Curriculum Project Algebra II* (Price Laboratory School)
M116 *Mathcue: Fundamentals of Math* (Metagraphics Software Corp.)

Synthesis of Project SYNERGY Reviews for Math

SOFTWARE ID	M118	M120	M121						
# of Reviews (up to 3)	1	1	1						
INSTRUCTIONAL MODE	**Implemented Satisfactorily? Y=yes, N=no, X=mixed**								
Drill and Practice	Y	Y	–						
Tutorial	N	Y	Y						
Simulation	–	–	Y						
Game	–	–	–						
Comprehensive Tool	–	–	–						
Partial Tool	–	–	Y						
C O V E R A G E	**(Numbers in parentheses represent the number of objectives/attributes.)**								
TOPICS	**percent of objectives implemented satisfactorily**								
Base Ten Notation (8)	0	0	0						
Basic Ops/Whole Numbers (10)	0	0	60						
Prime Numbers & Factorization (4)	0	0	0						
Basic Ops/Positive Fractions (19)	0	0	68						
Basic Ops/ Positive Decimals (13)	0	0	15						
Ratio and Proportions (6)	0	0	100						
Percents (7)	0	0	86						
Units of Measure (10)	0	0	100						
Basic Geometry (41)	0	0	63						
Basic Ops/Signed Numbers (10)	0	0	60						
Real Numbers (25)	0	72	20						
Set Notation (7)	0	0	0						
Simple Linear Eq./One Variable (7)	57	100	71						
Simple Linear Ineq./One Variable (6)	50	67	0						
Integer Exponents (9)	0	100	56						
Polynomials (18)	44	94	0						
Factoring (6)	100	83	0						
Graphs (21)	67	81	0						
Solving Systems of Equations (9)	67	67	0						
Quadratics (9)	22	89	11						
Rational Expressions (5)	0	100	0						
Rational Exponents & Radicals (9)	0	56	0						
Geometry (7)	0	0	29						
CONTENT ATTRIBUTES	**percent of attributes implemented satisfactorily**								
Accuracy (3)	100	100	0						
Appropriateness (5)	100	100	0						
Feedback (3)	100	100	0						
MEETING FACULTY NEEDS	**percent of needs implemented satisfactorily**								
Ease of Implementation (6)	83	100	67						
Adaptability (6)	67	67	100						
Summary Information (6)	0	0	100						
MEETING STUDENT NEEDS	**percent of needs implemented satisfactorily**								
Ease of Use (7)	43	43	14						
Adaptability (4)	25	50	50						
Testing (3)	0	33	0						
Tracking (2)	100	100	50						
Interactivity (7)	100	100	86						
Appropriateness (18)	33	56	56						
SOFTWARE OPERATIONS	**percent of operations implemented satisfactorily**								
Reliabilty (3)	100	100	100						
Format (7)	29	29	43						

The publisher is shown in parentheses in the list below:

M118 *Mathcue: Solution Funder* (Metagraphics Software Corp.)

M120 *Mathcue: Basic Algebra* (Metagraphics Software Corp.)

M121 *Everyday Mathematics* (Degem Systems, Ltd.)

Table 3.8

Project SYNERGY Software Selector (PS^3)

A significant achievement during Year Two was the design of *Project SYNERGY Software Selector*, or *PS^3*. It is an intelligent software program that helps faculty match up their individualized instructional needs with titles of IBM and IBM-compatible basic skills software packages reviewed in Project SYNERGY. The PS^3 database currently includes titles of over 170 software packages in reading, writing, and math, i.e., all those listed on ISAAC as shown in the previous syntheses. PS^3 will be updated periodically as new titles are added. Future enhancements to PS^3 will also include packages in ESL and study skills/critical thinking.

Using the faculty-developed Project SYNERGY learning objectives for each discipline, as well as the software attributes common to all disciplines, PS^3 searches the database to determine which software matches the objectives and attributes selected by the user (see Appendix A for a complete list of objectives and attributes). With a series of pull-down menus, the user first sets the **criteria** for PS^3 to use to search the database.

Under **User Preference**, the user specifies the following criteria:

Discipline - Reading, Writing, Mathematics.

Level of Content Matching - Whole Program, Topics/Subtopics, Individual Objectives.

Computer Environment - Networked, Standalone, Either.

Instructional Mode - Drill & Practice, Tutorial, Simulation, Game, Comprehensive or Partial Tool.

Minimum Acceptable Objectives Score - Percentage score for objectives "Implemented Satisfactorily."

Minimum Acceptable Attributes Score - Percentage score for attributes "Implemented Satisfactorily."

Under **Topics and Objectives**, the user specifies which topics/subtopics or individual objectives PS^3 should search for in selecting software titles. Under **Attributes**, the user specifies the weight — on a scale of 0 to 10 — to give to each of the software attributes. The user may also choose to use the default weights, which represent the average of all faculty reviewers' responses that groups of attributes "Should Be Present."

After the search criteria are specified, the user may instruct PS^3 to search the database. PS^3 will then display a list, ranked by percentage score for the objectives implemented satisfactorily, of the software titles that meet the user's criteria. PS^3 can also search the titles in the database for a match on one or more keywords. The user may elect to see the complete review information for any software title by clicking on it. That information will include the following:

Software: Title, Author, Version, Operating Environment.

Publisher: Name, Address, Telephone Numbers.

Reviewers: Name, Address.

Objectives: For each objective, the number of reviewers who said the objective is "Implemented Satisfactorily," and the number who said it is not.

Attributes: For each attribute, the number of reviewers who said the attribute "Actually Is Present," and the number who said it is not.

PS^3 can print the list of matched software, the complete review information on any selected software title, and a complete list of information on the software publishers.

Plans are underway now to market PS^3 on a national scale. PS^3 will greatly facilitate the process for developmental faculty of finding quality software to suit their individual needs.

Software Conversions

This activity in Project SYNERGY has a limited number of quality software packages being converted to a standard IBM Windows platform. The *Year One Report* described the process by which software packages were evaluated, selected, and categorized as *First Choices, Alternates,* or *Needing Additional Review* for conversion. During Year Two of the project, all the vendors of *First Choice* software were sent packets of information regarding the project, with contracts to sign if they were interested in converting their *First Choices* and *Alternates* software. In addition, the vendors of software packages *Needing Additional Review* were contacted. To date, seven vendors have signed contracts to convert the following software to a standard Windows environment:

Reading

R001 Speed & Strategy Reading Efficiency System J - K (Weaver Instructional Systems)
R024 Reading Efficiency System (Weaver Instructional Systems)
R026 Learning 100 HA (EDL)
R027 Learning 100 EA (EDL)

Writing

W010 Comma Sense I 1985 (Richard Berkey)
W045 Proteus: The Idea Generator (Research Design Associates)
W062 Comma Sense II (Richard Berkey)
W077 Maxthink 89 (Maxthink, Inc.)
W078 Mark-Up: A Punctuation Tool (Research Design Associates)
W080 Tanglers (Research Design Associates)

Math

M001 Pre-Algebra (The Math Lab)
M002 Beginning Algebra (The Math Lab)
M003 Intermediate Algebra (The Math Lab)
M023 Microcomputer Curriculum Project Pre-Algebra (Microcomputer Curriculum Project)
M027 Microcomputer Curriculum Project Algebra 1 - Vol. 1 (Microcomputer Curriculum Project)
M030 Microcomputer Curriculum Project Algebra 1 - Vol. 2 (Microcomputer Curriculum Project)

We expect all conversions to be completed during 1992. The converted software will then be reviewed by faculty and tested with students.

Part Two: Software Implementation Studies

Victor Nwankwo
Project SYNERGY Software
Implementation Coordinator
Miami-Dade Community College

Classroom environment is a complex interactive process with numerous variables that are often dynamic, and it presents an interesting but a difficult dilemma in teaching, learning, and research. Not only do we have to continue to reshape this environment to our advantage, but also we must develop different strategies to achieve the desirable end result of getting more students to complete a course with a passing grade. Other goals such as making class challenging enough for all students, motivating students, maximizing class time, and so on are means to that end. In seeking the end results, some faculty members continually make changes and incorporate new ideas into their teaching methodology to see what might affect a desirable and efficient change in the student with minimal expenditure of resources, energy, and time.

The implementation of computer software adds to the number of variables already in play and requires careful and systematic attention. Through many years of working and seeking innovative ways of applying technology to teaching and learning, Dr. Kamala Anandam, Project SYNERGY Director, has conceptualized a model for software implementation. The five stages in the implementation model are as follows: **Awareness, Analysis, Accommodation, Assimilation,** and **Adoption**. The definition of these stages, as she outlined in our *Software Implementation Report*, is enclosed for your reference. This second implementation report is also in the context of that model.

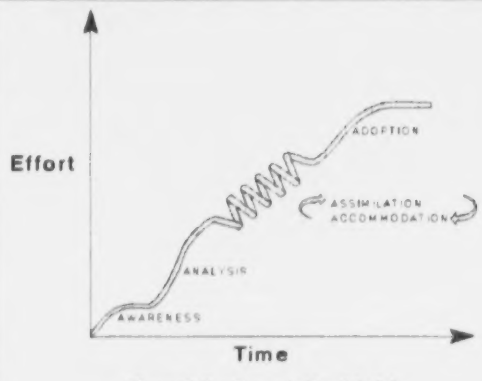

Figure 1: Implementation Model

- **Awareness** is the first stage. This is the stage when faculty learn about software in conferences or through journal articles and publicity materials.
- **Analysis** is the second stage. During this stage faculty spend an appreciable amount of time reading about the software, talking to users, examining the software, discussing the possible ways to use it and how to assess its usefulness.
- **Accommodation** is the third stage. At this stage, faculty begin to use the software with little or no change in what they do by way of teaching. Software is seen as an "add-on."
- **Assimilation** is the fourth stage. This is the stage when faculty begin to realize that what they do by way of teaching could change, and should change, in order to enhance the benefits of using technology. Also, faculty recognize that institutional support is required to alter some of the traditional practices in order to more fully integrate technology with teaching and learning.
- **Adoption** is the fifth stage. After several iterations of the *Accommodation - Assimilation* cycle, the use of technology becomes operational during this stage.

Anandam. *Software Implementation Report.* Miami, FL: Miami-Dade Community College, 1991.

Each stage requires varying amounts of effort and time on the part of the faculty. The transition from accommodation to assimilation presents the greatest challenge to the faculty and administrators. It needs a great deal of collaborative effort and departmental support. The iterative nature of the accommodation-assimilation cycle does permit faculty to take steps small enough to ensure their personal success and comfort while they refine their implementations. From our initial implementation study through the second implementation, we have seen some of the faculty progress from one stage to another.

Our initial implementation study was conducted in Winter Term (January-April, 1991). We had nine faculty members, two in reading, four in writing, and three in math. A total of 279 students were enrolled in the Electronic Classroom at Miami-Dade's North Campus. The findings in the first implementation study were encouraging: most of the faculty members became more energized and involved in their particular software after students started using it; most of our experimental groups registered higher course completion rates; students who used Realtime Writer scored higher on their departmental holistically scored essay; and students adapted easily to their software with great interest, contrary to some faculty's belief. Our concerns were how to minimize the dropouts early in the semester and how to help students move from "progress" to "satisfactory" grades. Additionally, the fact that some students in both the experimental and control groups scored less on their CPT post-test than on their pre-test intrigued us.

Following the completion of the initial implementation study, one faculty member took a professional leave, one could not participate because of illness in the family, and another elected not to participate for the Spring/Summer Terms (May-July 1991). However, during this time, three new faculty members joined the project. No formal report was required of the faculty for these terms; a total of 337 students were enrolled in the Electronic Classroom. The faculty explored the software further and modified their research designs for the Fall Term (August-December, 1991).

To address some of our concerns from the initial implementation study, in Fall Term (August-December, 1991) 5 of the faculty members elected to replicate their studies, and 1 participated in the formal study for the first time. Since there are several operational variables involved in the study, we felt that using two experimental groups with slight variations in these elements might yield greater understanding. Four of the faculty had two experimental groups each who used the Electronic Classroom and a control group that used the traditional Reading or Writing Labs. A total of 320 students were enrolled in the Electronic Classroom for the term.

Although not statistically significant, the experimental groups in five case studies in the second implementation study showed greater improvement in terms of the number of students who earned a "satisfactory" grade, compared to the control groups as well as to the experimental groups in the first implementation study. For the faculty in math, the results were reversed, which we think is attributable to the change in method of selecting students for the experimental group. Quite encouraging in this case is the fact that the faculty member has developed several scenarios that could explain the present outcome and how it could be improved next time around. On the other hand, one of the faculty in reading tried PLATO with students in the entry-level reading program instead of using it for those in the second-level course as she did in the first study; a significant number of students earned a "satisfactory" grade when compared to the control group.

Although the concern about dropout rates still remains, one promising observation in the second study is that the dropout behavior in the experimental groups did not all happen in the beginning of the semester. Students' scoring less on The CPT post-test than on the pre-test also recurred, although to a lesser degree in terms of the number of students. This pattern has persisted, however, in spite of informing the students in the second study that their improvements in the post-test would be included in their grades.

We are working closely with The College Board and Educational Testing Services about our observation that some students scored less on their CPT post-test than on their pre-test. Considering

the first and the second studies, 40 out of 139 (29%) students in reading, 42 out of 152 (29%) students in writing, and nine out 107 (8%) students in math scored less on their post-test than on their pre-test. Since there were fewer cases in the math groups, a question that comes to mind is the degree of correspondence between what is tested and what is taught. The standard error of measurement in testing itself could account for this observation. In fact, 24 out of 40 in reading and 24 out of 42 in writing were within one standard error of measurement. This, of course, raises a question on the use of CPT as a pre- and post-test. However, we need further investigation to answer our questions.

On a more personal level, after muddling through the first implementation phase, the faculty became even more creative in finding different approaches to using the same software. Those with two experimental groups had different requirements and different expectations about what impact the particular approach might have in the same population of students. The levels of their expectations were more realistic, and most of them became more cooperative and tolerant of what they term "hassles" that are inherent in the computer environment. It was no longer as difficult for them to deal with, say, students having problems because they forgot their password and needed to be cleared before they could get back into the system.

The positive attitude of the faculty had a direct correlation with the level of interest shown by the students. More students in all the experimental groups completed more work on their own than did those in the first implementation study. There was a high sense of growth in each of the faculty in terms of experimenting with technology. They have now become "mentors" in their respective departments. More of their colleagues are being brought over to share some of the interesting discoveries and the potentials of *their* respective software packages. They were open-minded in discussing what they tried that did not work, the context in which they tried it, and some tips that could have worked had they known what they know now. When a number of faculty use the same software with different teaching methodologies, the results differ, thereby stressing the richness, power, flexibility, and potentials of technology.

We have seen some faculty move from asking what technology can do for them to asking how they can harness the power and potentials of technology to assist their students as they progress from being underprepared to becoming mainstream students. Making this progress requires an environment conducive to software implementation, which involves collaboration and cooperation of all parties — software vendors, administrators, support staff, faculty, and students. Given the countless tasks the faculty face, it is crucial that support staff be involved in assisting the faculty with the challenging task of combining teaching and research. When the support staff serves as a resource for the faculty, the additional demand of classroom research is substantially reduced and the faculty can focus more on dealing with changes needed in their teaching.

In analyzing the results of the second study, we found that more of the faculty are looking toward themselves and ways to improve their teaching methods by taking advantage of the software rather than dwelling on the short-comings of the software. As we experiment, it is imperative that we understand and accept any result with an open mind because we often learn more through unexpected outcomes.

Technology offers power and flexibility and thereby holds great potential for improving teaching and learning. The incremental process allows us to take small but significant steps in systematically applying technology to teaching and learning. Our second implementation study further exemplifies what is involved in these steps the faculty take to adopt technology. The Software Implementation Model, with its emphasis on formative evaluation, seems to create an environment conducive for faculty to experiment with technology and teaching, assess the outcomes, and make necessary modifications to improve the outcomes. To fully realize these potentials, we must all get involved. The following case studies of the faculty show that we are making substantial progress in this direction.

Use of PLATO for Reading

Daisy Walker has worked with the underprepared students at Miami-Dade Community College's North and South Campuses since 1982. At South Campus, she taught reading and writing classes, but she has chosen to teach only reading at the North Campus. She received her B.A. in English from Tuskegee University in 1963 and M.A. in Reading from Barry University in 1976. Currently, she is working toward a doctoral degree in Reading and Learning Disabilities.

The Setting

Rationale for Continuing the Study

During the first study, I used two of my REA 0002 classes. One class had the computer-assisted instruction (PLATO) while the other was tutored either individually or in small groups as part of our traditional Reading Lab services. Both classes received classroom instruction from me but were required to attend their respective scheduled labs.

Students who used PLATO were required to complete 24 of the 25 routing activities I had constructed for them. As part of the research design, I did not attend their lab regularly, but I provided feedback to my students by using the PLATO weekly reports. Most of the students waited until the last minute to complete their PLATO assignments, and, because of incomplete assignments, many received a "progress" grade instead of the "satisfactory" grade required to exit the course. The dropout rate was the same for both my control and my experimental students (13%).

One of my favorable observations about the Electronic Classroom and the PLATO reading material was that they appeared to be very motivating to my students. At the conclusion of this study, I wanted to know what might happen if I were to use PLATO with a different population of students because of the diversity of the reading materials. My feeling that PLATO reading materials could be very useful in our first reading course (REA 0001) prompted me to select this group of students for the second study.

About the Course

In recent years, an increasing number of students have enrolled in the first reading course because they have scored between 0 and 4 points on the Multiple Assessment and Placement Services (MAPS) test, or below 45 points on the Degrees of Reading Power (DRP) test. Students are also placed in REA 0001 when they score below 7.0 in vocabulary and comprehension on the Nelson Denny reading test (Forms C-F).

In our first reading course (REA 0001), students are taught to understand phrases, paragraphs, and passages to help them study and understand texts across the curriculum as well as printed materials encountered in their communities. Some individual reading programs need to include mastery levels below 4.0 because the students are not proficient in English or because they have not been studying for many years. The cultural/intergeneration factors in this student population require that our reading department include services for some who are over 40 years old and who have language problems. The wide reading ranges and uniqueness of individuals' reading needs dictate innovative, interactive, multileveled and multimodal programs to correct reading weaknesses.

About the Students

Instead of the popular random selection, the students in this study are identified by their deficiency in reading based on their low reading scores on the MAPS test. Two of the instructors' reading classes were used in the

study to measure the effectiveness of the PLATO program. The experimental group used the PLATO program in the Electronic Classroom while the control group used the traditional reading lab. This current study involves students with varying ethnicity and multicultural background; English is the second language for many of them.

The experimental group started with 24 students; 78% identified themselves as Black or African-American, 21% as Hispanic and other (Haitian) categories, while 37% claimed English as their second language. The average age of the experimental group was 19 with ages ranging from 18-40. The average MAPS reading score for this group was 2.8.

The control group started with 27 students. This group had 56% Black or African-American, 44% Hispanic, and 56% claimed English as a second language. The average age for students in the control group was 20, ranging from 18-48. This group had an average MAPS reading score of 2.7.

There were more females (experimental, 65%; control, 87%) than males in both groups.

About the Software

Please see a description of PLATO provided in Appendix C.

The Design

I selected two of my REA 0001 classes. The experimental group used the PLATO reading material in the Electronic Classroom while the control group used the traditional Reading Lab. Both groups were required to attend two class sessions and one scheduled lab meeting each week. In our Reading Lab, students are tutored individually or in groups and the instructor is not required to attend this meeting. The tutors were students who had passed English and had good reading skills. The materials used in the lab were grade-leveled books, kits, computer programs, and audio tapes. The Reading Lab Coordinator recorded and reported students' progress in students' folders, which teachers could request to see.

In the Electronic Classroom, I structured 25 routing activities in PLATO to complement my classroom instruction as in the previous study. I also modified PLATO by removing the placement test embedded within some of the routing activities in order to allow students more time to work on skill development. Students used the PLATO materials to review and reinforce their regular classroom instruction.

It is important to understand that the Electronic Classroom and the traditional lab programs were structured for all students to develop personally as they organize themselves to complete those skills required of them. Another important goal was to strengthen the students' self-concept by monitoring their reports and soliciting their thoughts as they were learning the designated reading strategies.

The Computerized Placement Test (CPT), a reading measurement test by The College Board, and the students' final grade were used to compare student performance. Students in both groups were required to take the CPT pre-test within the first week of the term and a post-test a week prior to their finals. The difference between CPT pre- and post-tests point gain for students in both groups was compared. Grades were based on student performance on either the Nelson Denny or DRP. To obtain a satisfactory grade, students were required to demonstrate their ability to read and understand materials at the seventh-grade level. The dropout rate for each group was also determined by the number of students who remained in class through the semester. Student participation and motivation were also compared and contrasted based on common observations, attendance, and the level of interest in the class. Students' interest in and reactions to either lab are based on students' comments and responses generated during class discussions.

Monitoring the Study

It was very satisfying for me to watch my students take control of their learning rather than wait for the instructor to provide all the information they need. The PLATO program provided an avenue for them to ask questions about skills with which they were having problems. This high level of involvement or motivation was generally reflected in their participation as they sought answers about other material that could assist them. The positive attitude of students in the experimental group opened up the door of complementing the computer program with a human touch. It gave me a warm feeling when students were motivated enough to make time for searching extra materials and asking for assistance. It gave me an opportunity to show the students that we care about them and their problems, dreams, and aspirations.

The PLATO report was very useful in showing students how they were doing on a weekly basis. Students were usually surprised at the amount of information that could be generated from these reports and how I related some of the information to their study habits. During the first few weeks of the term, I found that some of the students spent a lot of time on some of the modules. Students must pass either a pre-test or the post-test for a module in order to move on to the next module. Usually, they were given a pre-test for each module and, if they passed it, they skipped to the next one. If they failed the pre-test, they had to complete a tutorial lesson for that module in order to take the post-test. I found that some of the students did not take notes or pay close attention when going through the tutorial; this usually resulted in their failing the post-test. In PLATO this process could be repeated several times for a module. The PLATO weekly report provided me with this kind of information, which is useful in assisting students. Generally, I took time to go over their individual reports and make comments.

I felt very proud of my students this term because they seemed really motivated. Initially, I felt that most of them might not be able to complete all the routing activities since some of my REA 0002 students had failed to complete them in the previous study. I started informing them from the beginning of the term that they had to complete all the routing activities, and it made a significant difference in the completion rate when compared to that of the students involved in my previous study. They attended their lab regularly since I constantly notified them about its importance. They decided which modules they wished to work on and how much time they needed to complete all the routing activities. It is important here to stress the need for faculty involvement with student lab work and progress. Students in the experimental group tended to increase their lab attendance above the weekly requirement after I reviewed and talked to them about their performance in the lab.

The students in my control group were encouraged to attend their lab and work with the lab tutors. I also reviewed their folders occasionally. However, it was simpler for me to work with the PLATO weekly report because all the skills students worked on and how they performed were clearly summarized in a readily usable form for student advisement.

Student Outcomes

Students in both the experimental and the control groups took the CPT pre- and post-tests to measure their reading improvements for the term. Figure 1 shows the point gain for each group. Point gain is the difference between CPT pre- and post-test scores. A positive score means that the student scored higher on the post-test than on the pre-test, while a negative point gain means that the student scored higher on the pre-test than on the post-test. In the experimental group, 18 students completed pre- and post-tests with an average score of 38 for the pre-test and 41 for the post-test. The average point gain for this group is 3, with 10 students showing a negative point gain and 8 students showing a positive point gain. There were 23 students who completed the pre- and post-tests in the control group, with an average score of 41 for the pre-test and 42 for the post-

test. The average point gain for this group is 1. In the control group also, 10 students showed negative point gains. In comparison to the control group, the experimental group performed better (by 2 points) in terms of CPT average point gains. The fact that some students in both groups showed negative point gains raises questions about CPT reliability as a measurement instrument for pre-/post-tests.

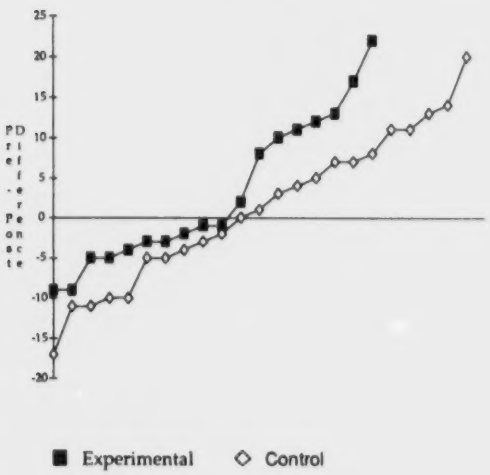

Figure 1: *CPT Difference Scores for Experimental and Control Groups*

In addition to the CPT pre- and post-tests, final grade distribution shows overall performance for both groups. Students must earn a satisfactory grade in order to exit REA 0001 and take the next higher course, REA 0002. If students earn a progress grade, they must repeat the course. Table I shows how the experimental group compared with the control group. A greater number (71%) of students in the experimental group earned a satisfactory grade, with a smaller percentage (8%) of students withdrawing from the course. In the control group, 52% obtained a satisfactory grade. Many students made significant progress but not enough to earn the required satisfactory grade to exit the course (33%). The withdrawal rate for this group was 15%. Compared to my previous study using REA 0002, with 42% earning a satisfactory grade, the REA 0001 students in the second study made a remarkable improvement with 71 % earning a satisfactory grade and only 21% getting a progress grade.

I am very proud of my students in the experimental group because they worked very hard and it is reflected in their grades. In my previous study, I had many students in the experimental group who made a progress grade, and I expected the same to occur with this population. This leads me to some plausible interpretations about students' performance and the PLATO software. Does this mean that my routing activities are better suited to REA 0001? Why did more students in my REA 0001 complete more of the routing activities than did my students in the previous study? The only change in the routing activities was to remove all PLATO placement tests. Could this be responsible for the high completion rate, or could it be due to my personal involvement? These are the questions that need further analysis to see how we can better help students master reading skills. I'd like to repeat this study with the same population of students to see if the same favorable results could be obtained.

Figure 2 exemplifies the diversity in students' time-on-task in PLATO and student grades. Students who had a satisfactory grade completed their 20-hour lab requirement and were able to put in additional time. Since students were allowed to work at their own pace, PLATO data showed that some students spent as little as 20 hours to complete all the 25 routing activities, while it took one student over 100 hours. This is one of the advantages of computer-assisted-instruction when it comes to

Table I

Final Grade Distribution

Class/Grade	*Satisfactory*	*Progress*	*Unsatisfactory*	*Withdrew*
Experimental N=24	71%	21%	0%	8%
Control N=27	52%	33%	0%	15%

the personal motivation of some students. These students showed a greater sense of wanting to learn; they had questions about materials they did not understand or had problems understanding. I have followed some of my students to the Electronic Classroom just to assist them because of their level of interest.

It is also necessary to state that most of the students who spent an unusually great amount of time on PLATO had disabilities.

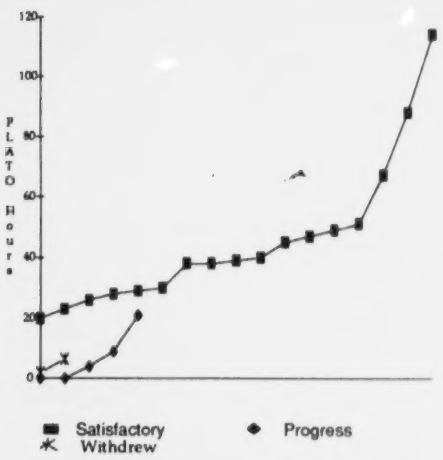

Figure 2: *PLATO Hours and Final Grade for the Experimental Group*

Recommendations

To My Department and My College

The time has come for us to require all REA 0001 and 0002 students to master at least 20 of the 25 PLATO routing activities in reading. This ensures us that they have basic reading strategies, and, since PLATO allows the students to make decisions, they are forced to plan and meet schedules. They are required to respond to details and to make inferences, which are also basic skills. Funds should be allotted for labs to be open for longer hours and also for drop-in students. Student - computer interaction prepares students for better citizenry as they rid themselves of the fear of the machines that are routinely doing the work in their daily family and business encounters. Our department must always address the individual problems of students so that they will be equipped to read materials of all levels and on all subjects.

To the Students

Your attitude determines your lifestyle and degree of success. By using PLATO, you will learn to master basic reading skills at your own rate, and you will be assured of privacy when you are learning the most basic strategies. This program can serve as a firm foundation for your studying and understanding the printed word. It can help you to see other views as you learn new ways of comprehending ideas. Keeping a positive attitude and disciplining yourself to the routines of the program can help you become a better student.

Use of CSR for Reading

Gabriel Read has been teaching at Miami-Dade Community College for 30 years, 28 full-time. He has taught reading and English courses, both developmental and college-level, as well as courses in speech, social science, and ESL. His major commitment, however, has been to reading. He received his B.A. and M.S. in Education in 1960 and 1961 respectively from the University of Miami. Since then he has also completed advanced courses in Psychology of Reading at the University of California at Irvine and Florida International University.

The Setting

Rationale for Continuing the Study

For the first study, two classes in REA 0002 were arbitrarily selected. One class was assigned to the Electronic Classroom (experimental group), and the other was assigned to the Reading Lab (control group).

The skills exercises in both the Reading Lab and the Electronic Classroom were selected according to the students' pre-test scores. The rationale was to start the students at individualized levels. Because of the "new" nature of the computer in the instructional process, the initial computer assignments were selected on a lower level to ensure that the material would not be an obstacle in the course of computer instruction. It was deemed appropriate to provide some latitude and time for adequate orientation for those students who were not familiar with the computer.

My observations led me to believe that students who are outer-directed as opposed to being inner-directed might be subjected to a sense of intimidation by the computer and drop out of the course. The instruction in the Electronic Classroom and the Reading Lab was correlated with classroom instruction. The concepts, principles, and skills introduced and classified in the classroom were followed up on in the Electronic Classroom as well as in the Reading Lab. At least four weeks elapsed before I noticed that there were negative reactions to the Electronic Classroom; in fact, several students had dropped out without any notice. It was at this time that I recognized the factor of computer intimidation, which was in reality the perception of those students.

The original procedure was to permit the students to respond to the computer and programmed material individually and independently. The instructor's role was that of an observer. This policy might clarify the delay in recognizing those students who could not adjust to the computer format. The dropout rate ***initially*** was greater in the Electronic Classroom than in the Reading Lab, but as the semester evolved the dropout rate in the control group increased substantially. Only 69% of the control group successfully completed the course as compared to the 75% in the experimental group.

On the basis of the results in the first study, I surmised that there were students who readily adapted to computer instruction and those who were intimidated or alienated by it. My observations included the following:

- Some students liked to work with the computer; some did not.
- Some students could adjust to the computer; some could not.
- Some students had the self-confidence of independent readers who could explore and discover the information for

themselves; some students did not have the self-confidence to make independent decisions, but rather relied on others (tutors, instructors) to assist them in making those decisions.

- Some students eagerly pursued the computer as a learning tool, recognizing the reading skills employed in the programmed materials; other students could not dispel their apprehension of the computer, perhaps because it was a new machine with which they were not familiar; or perhaps their difficulty with the language and reading skills was compounded by their uncertainty with the computer itself.

My findings in the first implementation study showed that some students can benefit from CSR and the Electronic Classroom. What seemed even more promising is that all students can benefit from technology when it is appropriately combined with human help. One of the goals in replicating the study with some modifications was to determine how best to apply technology in helping students and making them become successful in our REA 0002 course within the semester. To determine if REA 0002 students could benefit from CSR reading material, I elected to use two experimental groups and a control group with varying lab requirements for each group. The effectiveness of CSR would be measured by comparing students' performance in all groups.

About the Course

REA 0002 is the second course in our developmental reading program for underprepared students. Students are placed in this course when their Multiple Assessment and Placement (MAPS) test reading score is 5-12 points. In order to achieve a satisfactory grade in the course, students must demonstrate the ability to read and understand text at a 10.5 grade level on the Nelson Denny reading test or score at least a 65 on the Degrees of Reading Power test, both of which are standardized tests. For the underprepared and multiethnic students attending Miami-Dade Community College, the CSR program proved to be suitable in our REA 0002 program. Since the majority of the students possessed little or no experience with computers, CSR's user friendliness was significant.

About the Students

The students in the experimental and control groups were representative of the diverse multiethnic, underprepared students attending M-DCC. A brief description of the makeup of each group follows.

The experimental I group started with 28 students. Fifty-two percent of students enrolled in this group were Blacks or African-Americans; 33% were Hispanics and 15% identified themselves as Haitians. English was the second language for about 66% percent of the students in this group. The average MAPS reading score for this group was 7.12.

The experimental II group began with 25 students. Eighty-one percent of students in this group were Blacks or African-Americans; 15% identified themselves as Hispanic and White while 3% stated they were Asian. Only 31% of the students in this group claimed English as a second language. The average MAPS reading score for this group was 6.38.

The control group started with 26 students. Sixty-four percent of students in this group identified themselves as Blacks or African-Americans; 35% were White and Hispanic. About 44% of students in this group claimed English as a second language. The average MAPS reading score for this group was 6.04.

About the Software

Please see a description of CSR provided in Appendix C.

The Design

In the second study, an attempt was made early on to select the students who might be better suited for the Electronic Classroom by giving students in one group the opportunity to select which lab they wished to attend. Two experimental groups were used for the second

study; one group (experimental I) was arbitrarily selected, and in the other (experimental II) an opportunity was provided for the students to choose between the Electronic Classroom and the Reading Lab. Most of the students chose to remain in the Electronic Classroom; only eight chose the Reading lab. The control group was selected arbitrarily for the Reading Lab.

Other than the manner of selection for the labs, the only factor that was different from the first study was that of module selection. Whereas the modules chosen in the first study were selected for the entire class, the modules in the second study were selected initially on an individual basis, determined by individual test scores. Comparable skills were included in the selection of modules for the students. After the completion of the initial modules, as students progressed to Level 5 modules, the modules were no longer individualized. The entire class worked on the same modules. It was determined that independent study should be encouraged, and, except for the assistance that students needed for access to the computer, they were permitted to pursue their programs without distractions.

As in the previous study, the Computerized Placement Test (CPT), a reading measurement instrument developed by The College Board, was used as a pre- and post-test to assess students' reading improvement. All students involved in the study took the pre-test during the first week of the semester and a post-test one week prior to the final week. In addition to the CPT, the final grades were used to assess how each group performed in relation to the other groups. The only difference between the control group and the experimental groups was the lab requirement. Students in the experimental I group were required to use CSR in the Electronic Classroom only for their lab. The experimental II group was given a choice to use CSR or to attend the Reading Lab, while those in the control group were required to attend only the Reading Lab.

Monitoring the Study

I observed that most students are aware of the electronic age and are aware of the fact that the computer pervades our society in business, in recreation, and in the home. Students' actions and their eagerness to master the computer demonstrated this awareness and recognition of their future roles relating to the computer world. The initial fear expressed by the students in word and body language was soon dispelled as the semester progressed. Their degree of success in manipulating the computer as a tool of learning, as a facilitator of information, was greater this semester than last. There was a greater willingness to explore, experiment with, and utilize the computer for instructional purposes.

The fact that the lab was open all during the day allowed students greater access and flexibility in fulfillment of the required lab time. The lab managers in the Electronic Classroom were available at any time for the students who requested assistance. The lab managers possessed much patience and understanding while assisting the students in completing the CSR modules. It is duly noted that patience and perseverance in the tedium of computer operations, especially where neophytes are concerned, is an essential trait for lab managers.

Students were encouraged to take notes when going through the tutorial lessons in CSR. The CSR weekly report was extremely useful in providing assistance to the student. The report summarized what modules the student worked on, how much time was spent, and how the student performed. This weekly report provided an avenue for finding out what types of problems the student might be having in the Electronic Classroom. The responses to the weekly reports and on the questionnaires were positive. The majority of the students liked the idea of working with computers. Once they became oriented to them, they were successful with them. Most of the students realized that the computers were actually "user friendly" and consequently lost their initial fear of them.

Regarding my belief about inner- and outer-directed students, I made one clear observation: students who wanted to learn, and who wanted to overcome their deficiencies, were willing to

explore any avenue to achieve their goals. I also noticed that even though certain types of students will function much better in the Reading Lab, where the "human touch" prevails, *most* students will adapt to computer instruction if adequately oriented and monitored.

Student Outcomes

The difference in students' CPT pre- and post-test scores is graphed in Figure 1 as point gain for each group. The experimental II group performed better than did the experimental I and control groups. The average point gain for students in the experimental II group was 11, and only 1 student had a negative point gain. These averages do not include scores for those students who elected to use the Reading lab since none of them completed the CPT pre- and post-tests. Students in the experimental I and control groups showed closely related performance. Four students in both groups had a negative point gain, but the experimental I group registered a higher average point gain of 7 compared to 5 for the control group. It is not clear why some students posted a negative point gain, an intriguing observation that needs to be investigated in future studies.

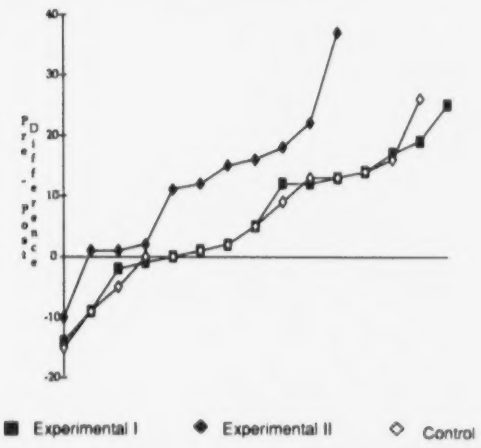

Figure 1: ***CPT Difference Scores for Students in Experimental I, II and Control Groups***

Figures 2 and 3 show the number of modules in CSR completed and the final grades for students in the experimental I and II groups respectively. Most of the students in both groups who earned a satisfactory grade completed more CSR modules than those who made a progress grade. In both experimental groups, it is not clear why some of the students who completed a considerable number of CSR modules could only attain a progress grade. I need to focus on the students who fall in this category in my future studies.

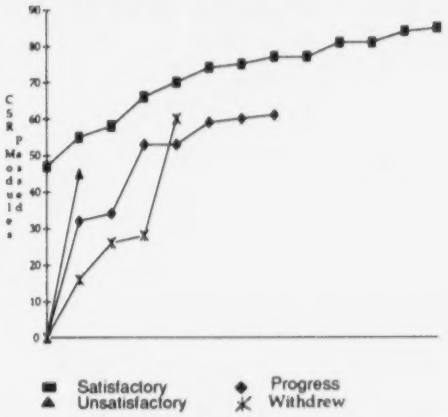

Figure 2: ***Experimental I Group Numb of CSR Modules Passed and Final Grad***

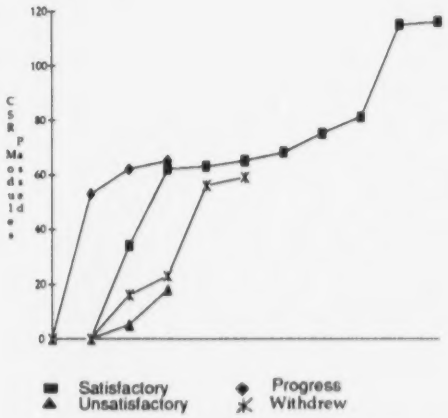

Figure 3: ***Experimental II Group Number of CSR Modules Passed and Final Grade***

The final grade for students in all three groups is shown in Table I. When the number of students who were successful (students with satisfactory and progress grades) in the course

Table I

Final Grade Distribution

Class/Grade	Satisfactory	Progress	Unsatisfactory	Withdrew
Experimental I N=28	46%	29%	7%	18%
Experimental II N=25*	44%	17%	17%	24%
Control N=26*	50%	15%	13%	21%

*Due to rounding, the percentages total 102% for Experimental, 99% for Control.

Table II

Final Grade Distribution For Experimental II Group Students

Class/Grade	Satisfactory	Progress	Unsatisfactory	Withdrew
Electronic Classroom N=17*	59%	18%	6%	18%
Reading Lab N=8	12%	12%	38%	38%

*Due to rounding, the percentages total 101%.

is compared, the experimental I group had the highest passing percentage (75%) compared to 65% for the control group and 61% for the experimental II group. The experimental II group, as shown in Table I, included the 8 students who opted to attend the Reading Lab. Among those 8 students, only 1 student completed the course with a satisfactory grade; 1 received a progress grade; 3 received an unsatisfactory grade; and 3 withdrew from the course. It is not clear why the few students who chose the Reading Lab did not perform as well. If these students were excluded, then experimental II had the best performance as measured by the percentage of students with satisfactory grades and course completion rate (Table II).

I attempted to develop a profile for the inner-directed or independent student, as opposed to the outer-directed or dependent student, by administering the 20-question Nowicki-Strickland Locus of Control questionnaire to students in the experimental groups. Since this was given close to the end of the term, only very few students with unsatisfactory and withdrawal grades completed the questionnaire. The analysis of the distribution of students' scores within the locus of control scale does not show any association between the locus of control orientation and successful completion of the course. No association was observed between locus of control orientation and number of CSR modules completed. Thus, the proposition that students with external locus of control will be less successful in the Electronic Classroom needs further investigation. The questionnaire should be given during the first week in order to determine the locus of control for all students with varying grades and number of CSR modules completed. This information could be used to ascertain if there is any relationship between course completion and number of CSR modules completed, on the one hand, and locus of control orientation for students in the experimental group on the other.

Recommendations

It has been clearly established that the computer and its utilization in our society is an idea whose time is here. This holds true for the field of education even more so. College preparation as it relates to students cannot be complete without inclusion of the computer as a working tool in the careers of tomorrow.

The computer lab facility can definitely become the means to assist underprepared students to overcome the barriers blocking their success in mastering the basic skills of reading, writing, and mathematics. The findings of this study

provide sufficient evidence to support a computer lab facility for the progressive development of students who lack certain fundamental skills required in our modern society. More students are now willing to accept the Electronic Classroom assignment. The fact that computers pervade the business world has proved to be a great incentive toward pursuing this modality of learning for all students.

The students, whether they were independent or dependent, whether they possessed experience operating computers or not, were eager to try this new "mechanical wonder" with the hope and intention of improving their skills in the programs. Their mindset was that this was an opportunity to learn about computers and/or to use this facility to achieve the skills necessary to reach their goals.

I would encourage the Basic Communication Studies Department and Project SYNERGY to coordinate their efforts to expand and improve a program to meet the needs of the diverse student body at Miami-Dade Community College. Further training of the faculty and staff is essential for a sound foundation of instruction in the twenty-first century. Enough data of the findings in Project SYNERGY clearly warrant further pursuit of this type of instruction. It is imperative that Miami-Dade Community College assist its students not only to develop a solid basis for learning, but also to master those skills and facilities that will be a normal part of our society after the year 2,000.

Bibliography

Nowick, S. and Strickland, B.R. "A Locus of Control Scale for Children." *Journal of Consulting and Clinical Psychology*, XL (1973), 148-154.

Use of PLATO for Writing

William S. Tillett has been a faculty member at Miami-Dade Community College for 23 of his 32 years in education. He was employed in 1969 to lead a group of four other English faculty members to develop a writing program for students who were underprepared in the writing skills necessary to function in the college environment. Tillett received a B.S. in English (1960) from Campbellsville College and an M.S. in Counseling & Guidance from Indiana University. He is working toward a doctorate in Curriculum (Florida Atlantic University) and Counseling & Guidance (Indiana University).

The Setting

Rationale for Continuing the Study

After reviewing with Victor Nwankwo, Software Implementation Coordinator, the results of my previous study, we both agreed that students needed to spend more time practicing their writing skills. To do this, we added into the replication study 1 hour and 15 minutes each week of in-class writing practice by using Microsoft Write in the Electronic Classroom. Each week, I gave students two topics from which to select one for developing a composition. If they were absent, they had to make it up on their own time. I evaluated the papers and returned them to the students at the next class session. I encouraged them to use the lab to work on their own.

About the Course

ENC 0020 is the second remedial course in writing designed to prepare students for college-credit courses. Students usually start working on writing skills for paragraph and multiparagraph compositions. The grading policy in Basic Communication Studies differs from the grading of most other college programs. Students may be assigned an "S", a "U", or a "P". An "S" ("satisfactory") indicates passing to the first college-level writing course, ENC 1100, and successful completion of the Basic Communication Studies program. A "P" stands for "progress" and a "U" stands for "unsatisfactory". Students are given the opportunity to complete ENC 0020 in one, two, or three semesters depending on the time needed for the student to achieve college-level writing skills. The exit requirement for ENC 0020 is a 4-paragraph composition on an assigned topic to be completed in 60 minutes. The final composition is holistically scored on a scale ranging from 1-8 by at least two other instructors. Students must score at least a 4 on the departmental essay to earn a satisfactory grade.

About the Students

I included three classes in my replication study.

The first group, the control group, had 10 Hispanic students and 15 Black students. The ages ranged from 18 to 27. The entire group scored between 20 and 30 on the Multiple Assessment and Placement Services (MAPS).

The second group, the experimental I group, had 5 Hispanic students, 14 Black students, 3 Anglo Whites, and 2 Oriental students. The age range was 18 to 42. All students in this group scored between 20 and 30 on the MAPS.

The third group, known as the experimental II group, had 8 Hispanic students and 18 Black students. The age distribution ranged from 18 to 46. The students in this group scored between 20 and 30 on the MAPS.

About the Software

Please see a description of PLATO provided in Appendix C.

The Design

The three groups included in the replication study were provided with different programs for their course. In all three groups a class session lasted for more than 150 minutes.

Control Group

- Two regular classroom sessions in the College Prep Writing Lab

Experimental I

- One regular classroom session
- One class per week in the Electronic Classroom using Microsoft Write
- 20-35 hours a semester in the Electronic Classroom using PLATO

Experimental II

- Two classroom sessions per week
- 20 to 35 hours a semester in the Electronic Classroom using PLATO

I also developed a system for referring students to the College Prep Writing Lab or the Electronic Classroom for the total number of hours that they needed to spend there. When I administered the diagnostic writing sample at the beginning of the semester, I evaluated students on the strength of their writing skills (holistic score of 1 to 4) and then assigned them the total number of hours required to finish the program. Students who got a score of 4 on this writing sample were assigned to work 20 hours in the lab; students who made a 3, 25 hours; those who made a 2 had to spend 30 hours; and those who made a 1, 35 hours.

In addition to a departmental holistically scored final essay (holistic score of 2-8), the Computerized Placement Test (CPT) was given to all the classes as pre- and post-tests to measure writing improvements. The pre-test was given during the first week of the term, the post-test toward the last week of the term. However, in addition to completing all course requirements, students also had to obtain at least a 4 on the holistically scored departmental final essay to get a satisfactory grade.

Listed below are my hypotheses for the current study:

- There would be more satisfactory grades in the experimental I group that used both word processor and PLATO.
- The experimental II group that used only PLATO would perform better than the control group would.
- The dropout rate would be lower with the two experimental groups using the Electronic Classroom.
- Attendance and class participation would be higher for the experimental groups.

Monitoring the Study

It has not been difficult to correlate what I do in the Electronic Classroom with what I do in my classroom. The students in both experimental groups had to work on all the advanced modules of PLATO, and it was a good review for them. If they could pass the pre-test, they moved to the next module within minutes. However, if skills were lacking, more time-on-task was needed. Some students spent 1-2 hours on some modules of grammar and mechanics if they were having problems. The Electronic Classroom lent itself beautifully to the individual pace of each student.

I did let a few students who excelled and were highly motivated work on additional modules that are available in the PLATO program. With PLATO's report, it was not difficult to determine where students were having problems in the Electronic Classroom. It was easy to determine when a student was not attempting to do the same module many times. It was clear to see that either the student was not understanding the material, or he/she just not giving the program serious consideration. When this happened, I spoke to the student personally. With encouragement, I often saw an improvement in scores on the next printout provided by the lab staff.

There were not too many changes in my use of the PLATO program compared to the previous semester. We did change the program for the experimental I group so that the students had

one classroom session per week to write with the word processor. I felt that this was very helpful in giving the students more time to write. I did feel that the group that got to use both the PLATO program and the word processor made more improvement in their writing, as well as in their grammar and mechanics. This can be seen in the report.

I also saw an increase in the involvement of my students in this study over that of the last study. Neither group complained, and I felt they were better able to see and understand their own progress. I should comment, too, that another semester of experience has helped the staff in the Electronic Classroom do a better job.

I was in the Electronic Classroom every week monitoring my students. I do feel it best that the teacher be seen in the lab each week doing follow-up work with the lab managers and letting the students see that you are there and concerned about their progress. I did also discuss with them their work each week during the regular classroom time. I gave the students a weekly printout of their lab activities provided by the Lab Manager.

Throughout the semester, I met with Victor Nwankwo, Software Implementation Coordinator. He was always helpful and considerate. I did not get to work much with Elizabeth Sotolongo this semester, but Mark Paris was always there to guide me and my students by answering questions and correcting any problem that we may have had. The staff in the Electronic Classroom reported to me every week. They most definitely added to my success as a teacher this semester. I am grateful for their support.

Student Outcomes

Only 19 students in the experimental I group completed the CPT pre- and post-tests with an average score of 60 for the pre-test and 68 for the post-test. The average point gain (or difference between pre- and post-test) for this group was 7. In the experimental II group, 17 students completed the pre- and post-tests with an average score of 60 for pre-test and 66 for post-test (an average point gain of 6). In the control group, 18 students completed pre- and post-tests with an average score of 58 for the pre-test and 61 for the post-test (an average point gain of 3). The difference between students' pre- and post-test scores is shown in Figure 1 for the experimental I, II and control groups. As the graph shows, both experimental groups show greater point gain than did the control group. The experimental I group shows a slightly higher point gain than the experimental II group does. It is also interesting to note that more students in the control group showed negative point gains. However, this poses a dilemma for all students in both the experimental and control groups who did not make a positive point gain when their pre- and post-test scores are compared.

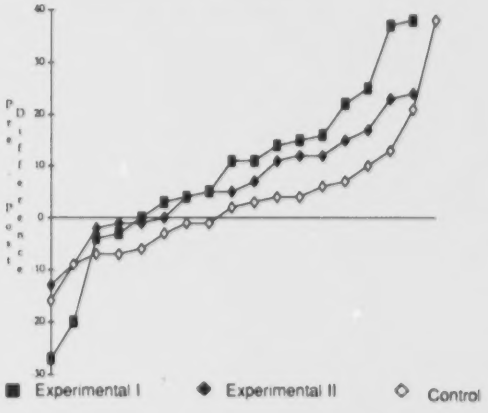

Figure 1: *CPT Difference Scores for Students in Experimental I, II, and Control Groups*

The total number of hours spent by students in their respective labs is shown in Figure 2 for the control group, Figure 3 for the experimental I group, and Figure 4 for the experimental II group. Some students who had spent as much time as had students who earned a satisfactory grade earned only a progress grade in all the three groups. The structure of the PLATO program makes it possible that this can occur since students work at their individual pace. PLATO data show that some students spent a great amount of time repeating some of the modules until they passed the post-test. These students, no doubt, spent a significant amount of time with PLATO. To some degree, this phenomenon also occurred in the regular lab, because students were allowed to work in an independent study mode. Another important factor that may influence the time spent

in the lab and the student's grade is the timing of student lab attendance. Some students wait until the last minute or toward the end of the term, despite warnings, and there may not be enough concentration at this time to grasp the material being taught. Their focus is on meeting the required time in the lab.

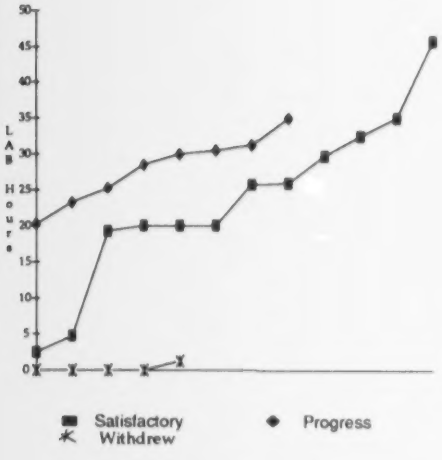

Figure 2: *Lab Hours and Final Grade for the Control Group*

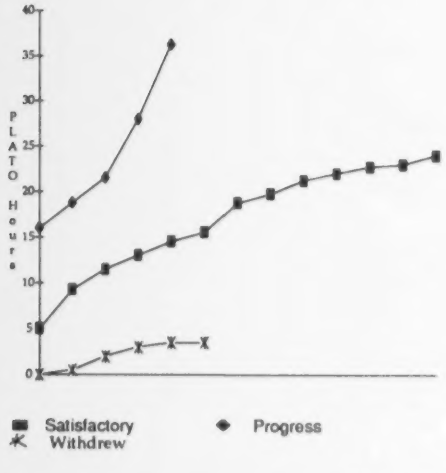

Figure 3: *PLATO Hours and Final Grade for the Experimental I Group*

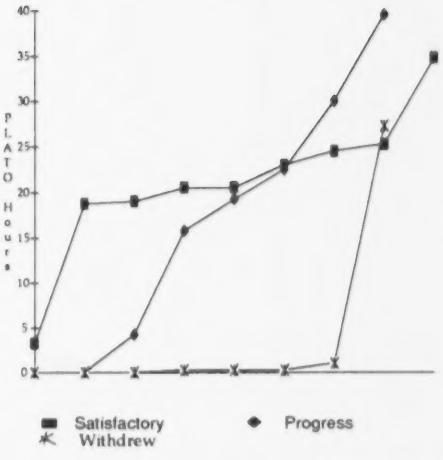

Figure 4: *PLATO Hours and Final Grade for the Experimental II Group*

Table I shows grade distribution for the experimental I, II, and control groups. In the previous study, I had several students who made substantial progress but not enough to earn a satisfactory grade. This was one of the underlying factors that propelled me to modify my research design by incorporating word processing and increasing the number of writing assignments for my experimental I group. I have a higher percentage of students in the experimental I group who completed the course with a satisfactory grade than in the experimental II or the control groups.

The departmental holistically scored essay results are shown in Table II. Here again, the experimental I group seems to have outperformed both the experimental II and the control groups. The same number of students in the experimental II group and the control group had a progress grade, which usually presents a concern for me as an instructor. The challenge has always been to find a workable avenue for assisting these students to be able to attain a satisfactory grade within the term. From the present study, it seems that increasing the number of writing assignments has helped steer more students in the experimental I group in

Table I

Class/Grade	*Satisfactory*	*Progress*	*Unsatisfactory*	*Withdrawal*
Experimental Group I N=24	54%	21%	0%	25%
Experimental Group II N=25	36%	32%	0%	32%
Control Group N=25	48%	32%	0%	20%

Table II

Possible Holistic Scores	*8-7*	*6*	*4*	*2*
Experimental Group I N=15	6%	67%	27%	0%
Experimental Group II N=15	6%	41%	47%	6%
Control Group N=19	5%	47%	42%	6%

the right direction. However, it will be helpful to repeat this experiment with a different population of students to see if I can obtain the same favorable results.

I feel that the ease of using the word processing program gave the experimental I group students more time to be creative. It also allowed them to go over their work and make corrections more readily. Again, this semester the experimental group that spent more time in the Electronic Classroom did considerably better than those last semester who did not use the word processor. With this in mind, I am going to have more of my classes using the word processor to write compositions in the Electronic Classroom — that is, if scheduling permits. Students will spend from 20 to 35 hours on the PLATO program and the word processor instead of in the College Prep Writing Lab.

It has been rather difficult to have only one or two classes in the program. I prefer to work with all of my classes so that I will have just one preparation, which is preferable in scheduling and teaching activities. I hope that in the next semester I can use the Electronic Classroom with all of my classes without the double preparation for the control group. I am now ready to move all of my students into the Electronic Classroom. Having all my classes there will allow me to individualize and fine-tune the PLATO modules for each student. I feel that, with an adequate combination of grammer review in PLATO and more writing practice, some of these students with a progress grade could perhaps earn a satisfactory grade. With the double preparation, it is diffcult to keep track of student progress.

Recommendations

I would without hesitation recommend the Project SYNERGY Electronic Classroom to my colleagues in the college and to anyone who teaches underprepared students. The wealth of material available in PLATO is far more than can be used in any one class in a semester. There is plenty of material here to develop one's own curriculum to include all the needs of our students.

I have been asked by my department chair to be the mentor of a new faculty member in our department. I invited him to attend my Electronic Classroom sessions and participate with the students. He did so and was extremely pleased. He is ready to join the team of those using the Electronic Classroom as soon as possible. He is already very knowledgeable with computers, so it would be very easy to move him right into this program when the next semester starts.

- I recommend that all of the lab hours required by the Basic Communications Department be done in the Electronic Classroom.
- I recommend that we increase the number of computers to handle more classes.
- I recommend that Basic PLATO be reserved exclusively for ENC 0002 students.
- I recommend that Advanced PLATO be reserved exclusively for ENC 0020 students.
- I recommend that we encourage more faculty to use the word processor as a method to encourage students to practice writing.

Use of CSR for Writing

Elaine Ludovici has taught writing courses at Miami-Dade Community College, North Campus, for the past 17 years and has served as Coordinator of the College Prep Writing Program and Labs for 14. She holds a B.A. and an M.A. in English (Clarion University, 1972 and 1974 respectively) and has completed some post-graduate courses in Education Administration at the University of Miami (1978-1980).

The Setting

Rationale for Replicating the Study

My decision to continue experimenting with CSR and the Electronic Classroom certainly did not stem from outrageous results the first time around; in fact, the outcome of my first study was somewhat discouraging. While students demonstrated progress, I had hoped that more students would have passed the department exam and, therefore, qualified to exit the program. Still, I knew that I had been working against the odds from the outset, since the reading scores of the experimental group were low and half of the students were enrolled in the course for the second time.

Would CSR be more effective with a higher-level student? What changes would I have to make in my curriculum to help prepare my students for the final exam, which was not an objective test but a timed essay? After my first study, I was convinced that if CSR or the Electronic Classroom was going to make a difference in my students' writing, I would have to be more actively involved, both with the software and with the students. I also hypothesized that a multicomponent teaching approach would provide more advantages to the students, and, as a result, enhance their writing performance. First, CSR could be used during class to address the skill areas not covered in the text, but still needed, as determined through objective testing and instructor-evaluated writing assignments. Second, Microsoft Write could be used for brainstorming, revising, rewriting, and editing activities. I had hoped that students might find computer-assisted instruction more appealing than the traditional classroom approach and that the word processor would help students to focus more positively on writing, rewriting, and editing. Poor penmanship would no longer be an issue, and rewriting would be less tedious. Finally, I would incorporate five timed writings in the College Prep Writing Lab (in addition to the four timed essays required in class) to give the students more practice with writing under pressure before they faced the final exam.

About the Course

This study involves students enrolled in College Prep Writing, a remedial writing course designed to prepare students for college-credit English courses. The College Prep Writing Program is a three-semester program; i.e., students are expected to complete the program in one, two, or three semesters, depending on individual levels, need, and degrees of language deficiencies. The grading system is also non-traditional:

U = Unsatisfactory
P = Progress
S = Satisfactory (Exit College Prep Writing Program)

About the Students

The control group began with 19 students attending class regularly. Two withdrew because of personal problems, and 1 withdrew because he felt the class was too advanced. A total of 16 students completed the course. The control group had the same percentage of Black and Hispanic students (45%) with 10% White. Fifty-one percent claimed English as a second language. Three students in this group identified themselves as having a learning disability and one of those students was enrolled in the course for the fourth time. All others were enrolled in the course for the first time. The average score on the Multiple Assessment and Placement (MAPS) reading test was 7.14.

The experimental I group began with 17 students attending class regularly. Two withdrew without giving an explanation. (One of these withdrawals was a third-time enrollee.) A total of 15 students completed the course. This group also had a high percentage of minorities, 50% Hispanic, 22% Black, and 22% White. About two-thirds of the students in this group claimed English as their second language. There were 3 students with learning disabilities in this group, one of whom was attempting the course for the third time. One other student was attempting the course a second time while all others were enrolled for the first time. The average MAPS reading score of this group was 7.41.

The experimental II group began with 18 attending regularly. Three withdrew: one received a promotion at work and his entire schedule changed; one claimed that he felt overwhelmed because of his language difficulties; and the third offered no explanation. Fifteen students completed the course. In this group, 55% identified themselves as Hispanic, 36% as Black, and 9% as White. Forty-six percent claimed English as a second language. The average MAPS reading score in this group was 7.92.

About the Software

Please see a description of CSR provided in Appendix C.

The Design

All students in College Prep Writing classes are required to complete 20 to 35 lab hours per term. During my first study I used the computer software (CSR) as the basis of my students' lab work. In both experimental and control groups, the curriculum in the lab focused on grammar and mechanics, while classroom instruction focused on writing and editing. Students in the experimental group were directed to fulfill their lab hour requirement by completing 26 CSR assignments in the Electronic Classroom, and students in the control group were directed to fulfill their lab requirement by working independently and/or with tutors in the College Prep Writing Lab (CPWL). Provisions were made for students in the experimental group who might have completed their CSR modules early and for those whose in-class writings indicated a need for the human touch to go to the College Prep Writing Lab.

In both experimental and control groups, the instructor, *ipso facto* the research design, was minimally involved. There was no instructor involvement during lab hours and minimal instructor involvement with CSR/CPWL assignments during regular class time. The study mainly concentrated on how students spent their lab time.

The results were somewhat discouraging because, while there was a correlation between the completion of CSR modules and the completion of the course, the number of students who earned a progress grade instead of a satisfactory grade presented a big concern for me.

What I Discovered

- Some students had not used their lab time wisely.

- When working on CSR, the experimental group seemed to be guessing at answers and spending little time on the tutorials. The students seemed only to be concerned with getting through the modules I had assigned.

- The experimental group spent minimal time working with tutors in the College Prep Writing Lab.

- Students in the control group also appeared to place more emphasis on meeting the minimum number of required lab hours than on learning itself. Their time in the College Prep Writing Lab was spent working independently instead of with a tutor.

- During College Prep Writing Lab hours for either group, little time was spent on writing, editing, and revising.

- The CSR courses would have to be coordinated differently. First, they would have to be presented in a different order. I had inadvertently assigned the most difficult module first. Some students may have been discouraged because their first experience with the technology was one of failure. Second, new modules would have to be reviewed and, if appropriate, added.

- The students appeared to be motivated by instructor involvement in lab activities, and there seemed to be a favorable response to Microsoft Write.

- More practice with timed writing was needed in both groups.

The first study definitely highlighted the need to correlate what I did in the classroom with what the students did in the labs, so during the Spring/Summer term, I decided to continue to experiment with the new technology. However, rather than removing myself by making CSR solely a lab requirement, I began to incorporate CSR along with word processing into my classroom activities as well. I began teaching in the Electronic Classroom, using a combination of CSR and Microsoft Write to address individual student needs. Students then were asked to complete unfinished class assignments on their own during lab time. In addition, they could review their papers with tutors in the College Prep Writing Lab.

Modifications for the Replication

I proposed two experimental groups and one control group for the replication study. Each group met with the instructor two days a week, and all students were required to spend a minimum of 20 hours beyond class time in a lab.

A major difference between the original study and this study is the involvement of the instructor, who met with both experimental groups in the Electronic Classroom during one of the class sessions. The control group was not altered except for redefined College Prep Writing Lab assignments.

To help determine if there was any difference between a grammar-oriented approach (CSR) or a writing-oriented approach (Microsoft Write), the instructional plan presented in Tables I and II was proposed.

Table I

Class Sessions with Instructor

Method of Instruction	*Experimental I*	*Experimental II*	*Control*
Regular Classroom	20	20	30
Electronic Classroom - CSR	0	10	0
Electronic Classroom - Write	10	0	0

Table II

Required Lab Hours

Lab	*Experimental I*	*Experimental II*	*Control*
Electronic Classroom	10	10	0
College Prep Writing Lab	10	10	20

The experimental I group would be introduced to Microsoft Write immediately. Until the last three weeks of classes, all CSR assignments were required to be done during lab hours. The experimental II group was introduced to CSR immediately. Students worked on CSR both during class time and during their lab hours. Not until midterm was this group introduced to Microsoft Write.

All groups in this study were required to complete five timed writing assignments in the College Prep Writing Lab in addition to completing their CSR modules and other course requirements.

Monitoring the Study

I felt more comfortable monitoring the progress of my study the second time around. For one thing, I observed a lot more because I taught in the lab. I looked forward to our sessions in the lab; attendance was good, and students were actually working before I arrived. I still tell my colleagues about the day I rushed out of class ten minutes after the session ended and, as I was exiting the room, I looked over my shoulder and observed all but one of my students still revising, editing, and rewriting on the computer.

I felt better about their lab work, too, because I always knew what my students were or were not doing. I knew how many hours they had spent in the lab, how many modules they had completed, which modules they were having difficulty with, and how much time they were actually devoting to each assignment. Keeping up with their work actually became easier for me because I was able to monitor it during class. And for the first time in years, my students could see in a lab report how their study habits related to their classroom performance. If they worked only ten minutes on a specific skill, they usually failed the post- test. Then, if they failed to take their time going through the tutorial a second time, they would fail the post-test once again. When I pointed this out to them, I would see a change in the approach to their work. Future CSR reports showed that students changed their behavior after seeing, and discussing with the instructor, their computerized printouts of time-on-task.

I also felt more comfortable about making adjustments in the curriculum. If I felt that students needed more practice with timed writings for the department exam or more individualized feedback in class, I would change my lesson plans for the week and meet with them in the regular classroom instead of in the Electronic Classroom. For example, even though I had originally planned to spend at least ten sessions with both experimental groups in the Electronic Classroom, I had cancelled two EC sessions with the experimental I group. Not only were they falling behind the control group and the experimental II group in class writing assignments, but also they were falling behind the experimental II group in the number of CSR modules completed. They seemed to be relying on their class time to complete their CSR assignments, not realizing that it was almost impossible to complete all course requirements, CSR modules and writing assignments combined, without spending extra hours in the lab outside of class time. I discussed this with them and, in fact, informed them that they were involved in this research project. I then compared their progress at that point with the progress of the experimental II group. Immediately, I noticed an improvement in how they spent their class and lab time.

The first two or three weeks were hectic, but they always are because of placement testing. For students in both experimental groups, the first month is especially confusing because they are being introduced to a new class that meets twice a week in two separate rooms and that has two separate lab requirements. Even more mind boggling is that the labs have different hours and different rules. Of course, the concept of the labs is also different, because one has computers while the other has a tutorial staff.

Nevertheless, I would not substitute one lab for the other because, after the students work their way through the hurly burly, their assigned activities in both labs actually complement one another. They review grammar and mechanics using computer-assisted instruction; and they practice timed writings and review their papers with tutors in the College Prep Writing Lab. Their lab activities are, more or less, planned for them. They know exactly what is expected and everything they do during their lab hours is directly connected to what they are covering in the class. Furthermore, without grading every lab assignment, the instructor can easily use the CSR reports to monitor the students' work and progress and to identify individual strengths and weaknesses.

Because College Prep Writing carries a lab requirement and because our department issues a policy emphasizing a department minimum, students tend to overemphasize the total number of lab hours they accumulate, rather than focusing their time and energy on improving their writing and eliminating sentence errors. (Our department even issues awards to students with the highest number of lab hours in the program and/or in a given sequence number and to faculty for the class with the greatest number of students attending.) CSR is helping students to view their lab requirements differently. While students in both my control group and my experimental groups remain concerned about their total number of lab hours, students in my experimental groups better understand what is expected of them and how they will be graded. They are more focused on completing specific assignments in each lab rather than completing a specific number of hours. Yet in order to complete the required assignments, they are forced by design to put time in the labs.

Notes from My Journal

- First month was chaotic. By the end of the first month some students were still confused because they had requirements in both labs.
- Student's initial experience with CSR was more positive this semester; I made a wise decision to start with one of the easier modules.
- After I returned first CSR lab reports, attendance picked up.
- One month into the semester and the experimental I group had already fallen behind in class writings. I cancelled two EC sessions to get them caught up.
- One month into the semester and the experimental II group was progressing well. They seemed to be moving further ahead of all my classes. They edited and revised their papers on time and I found myself assigning certain students extra writings while others were finishing their rewrites.
- Sometimes I felt overwhelmed with the CSR reports. I wanted to analyze every one. Of course, I did not have the time. Sometimes I would take them home and forget to distribute them to my students.
- I noticed a definite difference in my student population compared to last year. Many of my students were first timers in the program, unlike last year when I had students who had already had the program two and, in a few cases, three times.
- I felt that I had the opportunity to work more closely with my experimental groups than with my control groups. I am certain the computer helped.
- I felt frustrated because I had such limited control over what my control group did in the College Prep Writing Lab.
- I was thrilled with the new writing assignments I had instituted as part of all of

my students' lab activities. I felt the additional assignments helped to improve their writing.

- Working in the Electronic Classroom became more difficult as we got closer to final exam week. My students and I both felt the need to practice timed writings.

Student Outcomes

The difference between the CPT pre- and post-tests point gain for individual students within each group is graphed in Figure 1. Experimental I group students had an average score of 64 on the pre-test and 75 on the post-test, with an average point gain of 11. Four students in this group had a negative point gain while ten students had a positive point gain. Experimental II students had an average of 61 on the pre-test and 74 on the post-test, with the highest average point gain of 14. Three students in this group had a negative point gain.

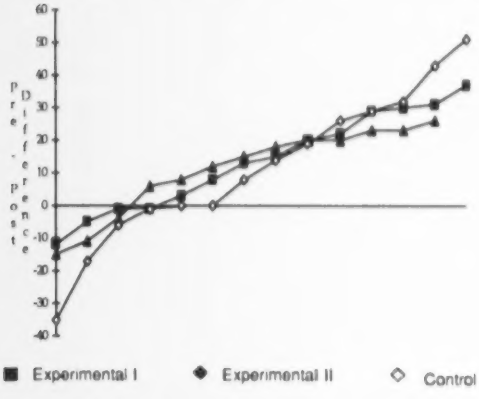

Figure 1: *CPT Difference Scores for Students in Experimental I, II, and Control Groups*

The control group had an average score of 53 on the pre-test and 63 on the post-test, with an average point gain of 11. Four students had negative point gain. Two students in the control group showed the highest point gain of all students in all three groups. These two scores contributed to a high average point gain for this group. When the average point gain for each group is considered, the experimental II group performed better than the other two groups did.

Figures 2 and 3 show the relationship between the number of CSR modules passed and the final grades for students in the experimental I and II groups. Not only did more students complete the required CSR modules this term than in the previous study, but these students also earned a satisfactory grade in the course. This shows an improvement when compared to the last study. Clearly, the instructor's active involvement makes a difference.

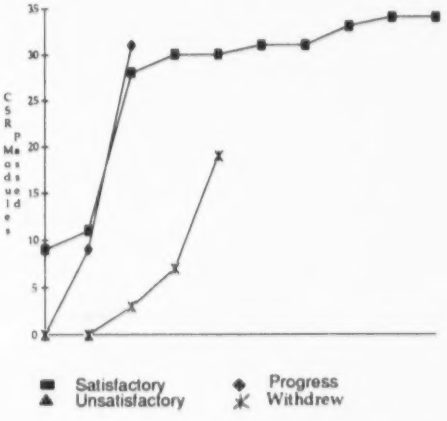

Figure 2: *Experimental I Group Number of CSR Modules Passed and Final Grade*

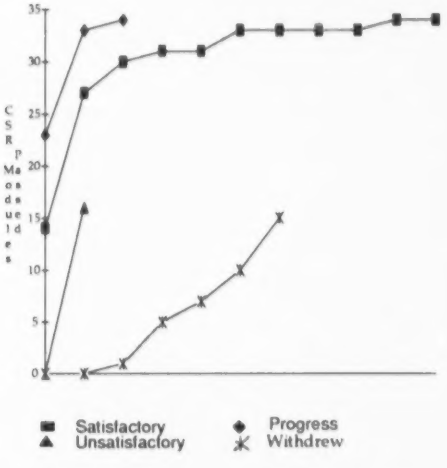

Figure 3: *Experimental II Group Number of CSR Modules Passed and Final Grade*

Table III

Holistic Scores for Students' Writing at the Beginning of the Term

Group/Holistic Score	*8-7*	*6*	*4*	*3*	*2*
Experimental I N=13			54%	38%	8%
Experimental II N=14			50%	43%	7%
Control N=14			50%	21%	29%

Table IV

Departmental Holistic Scores for Students' Writing at the End of the Term

Group/Holistic Score	*8-7*	*6*	*4*	*3*	*2*
Experimental I N=13		77%	23%		
Experimental II N=14	29%	64%	7%		
Control N=14	14%	29%	43%		14%

Table III shows the diagnostic holistic scores for students in all three groups. It shows the status of students' writing at the beginning of the course. To determine students' writing improvements this table should be used in conjunction with Table IV, which shows the departmental holistic scores for the experimental I and II and control groups at the end of the semester. The experimental II group performed better than did the experimental I and control groups, with more students obtaining scores in the upper range of the score scale. Although experimental I did not have students in the highest range, more students in this group showed greater writing improvements. In the control group, some students scored in the upper range of the scale, but many of the students who started at a low level did not make as much improvement in the their writing as the students in the experimental groups.

The final grade distribution is shown in Table V. Experimental I and II groups have more satisfactory grades than the control group does. The withdrawal rate is close for all groups, but more students in the control group earned a progress grade. None of the students in the experimental I group with unsatisfactory grades completed any modules in CSR, while one student in the experimental II group with an unsatisfactory grade completed 16 modules. I felt comfortable with the level of performance by the students in the experimental groups. By design they put in more time in the labs and this reflects in their performance. Some of them even put as much time in the College Prep Writing Lab as some of the students in the control group. I felt that my direct and active involvement in the Electronic Classroom had a significant impact on the amount of work and level of enthusiasm shown by the students. From the results of this study, it is difficult to conclude that the time of introduction of CSR or Microsoft Write will make any difference in students' performance. However, more students in the group that started using CSR (grammar-oriented class) at the beginning of the term showed greater improvement in their writing. It is clear that the combination of CSR and Microsoft Write produced more encouraging outcomes when the results of the first study are compared to those of the second study. CSR provides basic review for skills needed in grammar while students use Microsoft Write for writing and for making revisions or editing. I feel that both programs are essential in assisting students and in making them become successful in ENC 0020.

Table V

Final Grade Distribution

Class/Grade	*Satisfactory*	*Progress*	*Unsatisfactory*	*Withdrew*
Experimental I N=20	50%	15%	10%	25%
Experimental II N=23	48%	13%	9%	30%
Control N=23	26%	35%	10%	30%

Final Comments

Since I first began working with Project SYNERGY, I have been questioning whether or not all the time and energy I have spent on revamping my curriculum has been worth the effort. Why use computers in College Prep Writing Classes in the first place? Does student writing actually improve? What role does computer instruction play in students' overcoming their writing deficiencies? How will integrating computer instruction into my curriculum help students to do well on the department exam, particularly when the final exam is an essay? What are the benefits of programmed instruction? Do test scores improve? Is there any relationship between deficiencies identified through objective testing and deficiencies identified through a writing sample?

While I do not claim to have complete answers to all these questions, I am convinced that there are, indeed, benefits to familiarizing students with writing in a medium that has become increasingly common at home, in school, and in the workplace. As I am incorporating technology into my classroom instruction, I am finding my students more actively involved in their learning, more focused in the classroom, and more aware of their own strengths and weaknesses. The result is that student writing improves.

Experimenting with both computer-assisted instruction and word processing in my writing classes this past year has confirmed what I have always suspected — technology alone does not and cannot guarantee results. However, it certainly has managed to address some needs within my own basic skills curriculum. For instance, computer technology has enabled me to assign work according to individual needs, and it enables my students to work at their own pace. It has provided information regarding my students' progress, but more important, it has provided useful information regarding the students' study habits. It seems to have patience when my own is running out, and it has always managed to give positive feedback just when students have needed it the most.

Recommendations

To Faculty and Administrators

- Faculty interested in using technology, particularly those interested in teaching in the Electronic Classroom, need administrative support. They need time to train, time to plan, and time to work through the "technoshock" that occurs during the initial implementation.

- Instructional goals have to be clear to both faculty and students. Faculty need to establish the educational purpose of computer instruction so that they can manage their time and course requirements (don't be over-ambitious — try not to over-plan). Students need to understand how computer assignments will help them to achieve course goals.

- Faculty should be prepared to redesign curriculum so the integrated software program such as CSR or word processing program such as Microsoft Write will be different for each class. Lesson plans will change; homework will have to be adjusted so that students are not overwhelmed with additional requirements. Even the textbook may need to be reconsidered.

- An on-going feedback process between faculty and students is essential. Not all students will work at the same level or at the same pace. New course requirements and deadlines may interfere with, may even replace, the old. Flexibility will be critical.

- The administration can help faculty by providing technological support so that faculty can concentrate on the new curriculum and the students.

To CSR

- Provide more flexibility to change the level of difficulty for individual students.

- Provide different tutorials when students fail so that they don't feel they are reading the same text over and over.

- Provide more grammar modules and more variety in Level 4. Students with lower reading scores found Level 5 too difficult.

- Provide more modules on paragraph and essay development at Levels 4 and 5.

Use of Realtime Writer for Writing

Elena Perez is instructor of English at Miami-Dade Community College, North Campus. She has been with the North Campus English Department since 1989. Her first contact with underprepared students occurred earlier, in 1983, when she began one-on-one tutoring with groups of 5 to 7 students in the Writing Laboratory at North Campus. Because of her involvement with the ESL Writing Lab at North from 1986 to 1989, she is also familiar with the problems of students for whom English is a second language and who, once finished with their ESL course work, progress through the developmental program. Since becoming a full-time faculty member in the English Department, she has taught an average of 3 developmental courses per term. She received her B.A. and M.A. in Linguistics from Florida International University in 1987 and 1990 respectively.

The Setting

Rationale for Continuing the Study

The goals of the previous study (Lamazares and Tixier) were to examine the effect of affective, behavioral, and product evaluation measures on student writing. Affective considerations were measured through the use of the Writing Apprehension Test, a 26-item instrument developed by Daly and Miller (1975), having a reliability coefficient of 0.921. Behavioral considerations were measured through retention rates in the experimental groups as compared with those in all the other ENC 1100 courses offered at the North Campus. Finally, product evaluation was assessed by measuring the number of comments made on Camelot Type 5 feedback forms in the areas of mechanics and development of ideas for the first and fourth essays of the term. In addition, writing improvement was measured by contrasting the number of students who passed the holistically scored departmental essay exam in both control and experimental groups and by comparing their scores to the scores of the rest of the students enrolled in ENC 1100 at the North Campus.

The results of Tixier and Lamazares' study show that computer-assisted instruction (CAI) does indeed improve the writing of developmental students. Tixier and Lamazares report that both experimental groups became less apprehensive about writing than did the control groups and that this difference was significant at a probability level of 0.05. In addition, they report: "For both classes taught in the Electronic Classroom (EC) , the retention rate was higher and the failure rate was lower than the average of the remainder of ENC 1100 classes in the English Departmental Essay Exam for Winter Term (January-April 1991)." Lamazares and Tixier also report that writing did improve. The number of comments on the Camelot Type 5 form decreased for both areas, especially the development of ideas. In the holistically scored departmental essay exam, they found that the experimental groups scored at higher levels when compared to both the control group and the other ENC 1100 sections.

Among the positive observations, Tixier and Lamazares observed that, when working with Realtime Writer and Microsoft Write, students stayed on task for longer periods of time, wrote longer papers, discussed their writing in specific terms, participated in Realtime Writer discussions more than they did in the traditional classroom setting, and "enjoyed" themselves.

I first became interested in learning more about CAI after observing improvement in the writing

of students who had been advised to register for the Writing Lab and the Learning Disabilities Lab as a complement to my class and who, through their experience in these labs, had access to computers in completing their assignments. As a result of this, I did some reading in the area of computer-assisted instruction in writing.

Shortly thereafter, I became involved with Project SYNERGY for the first time when I taught two ENC 1100 courses once a week in the Electronic Classroom during Spring Term (May-June 1991). During that time, I observed an increase in student enthusiasm and motivation as well as an increase in student willingness to spend more time on the writing task.

After Tixier and Lamazares' report on the use of Realtime Writer and Microsoft Write was published, I became interested in further exploring the possibilities of CAI with developmental students, particularly because, as their report stated, "...the use of CAI with developmental students was an important area where the most dramatic results had been suggested by recent research." It seemed that continued study on the effectiveness of CAI and specifically on the effectiveness of Realtime Writer on the writing of developmental students was important — either to support or contradict previous findings.

About the Course

The students involved in this study were enrolled in ENC 1100: Introduction to English Composition. This is the last composition course at the developmental level. Students come to this course through three possible avenues: (1) they have passed previous lower-level developmental writing courses; (2) they have graduated from the ESL program; (3) they have scored between 30 and 36 on the Multiple Assessment and Placement Services (MAPS) test — scores too low for enrollment in first-year English Composition courses and too high for enrollment in lower-level developmental courses.

In the three-credit ENC 1100 course, the development of a standard four-paragraph essay free of most grammatical and mechanical errors is the focus. In order to receive a grade of C and thus move on to first-year composition (ENC 1101), students must pass a departmentally administered essay exam which is given under controlled testing conditions and is scored holistically. A passing score on this test is 6 (a score of 3 from each rater), raised from the cut-off score of 4 in the previous semesters because the scoring scale was changed from an 8-point to a 12-point scale.

About the Students

Between 60% and 75% of the entering students at North Campus require remediation in English, either through assistance in a writing lab, through enrollment in College Prep reading and writing courses, or through enrollment in ENC 1100.

Writing deficiencies of students enrolled in ENC 1100 range from composition problems (lack of sufficient development, lack of specific and relevant support) to word choice, vocabulary, and spelling problems, to non-standard grammatical forms (verb tense, subject-verb agreement, parallel structure, pronoun-antecedent agreement, etc.). The student population is a heterogeneous one including students enrolled in Learning Disabilities Labs, students who have completed previous developmental coursework, graduates of the ESL program who still experience difficulties using standard English grammar in writing, entering high-school graduates whose writing skills need improvement, and entering older students who have been out of school for as long as 20 years and need to review essay structure and standard English grammar.

Student attitudes about writing range from enthusiastic and industrious to negative. Motivation is usually low because of the frustration these students have experienced in some of their composition and other college courses. They also experience some degree of frustration because ENC 1100 is not a college-level course and yet is required of them before

they can enroll in first-year composition, which will provide them with necessary core credit toward graduation.

After initial placements and the third class roll of Fall Term (August-December 1991), 17 students were enrolled and regularly attending class in the experimental group and the same number was enrolled in the control group. Students filled out a questionnaire about their ethnic background, age, years of English in high school, and so on. Of the 17 students initially surveyed in the experimental group, 59% categorized themselves as African-American (10% of these had a Haitian surname and exhibited second-language writing difficulties), 23% categorized themselves as Hispanic, 12% categorized themselves as White non-Hispanic or Caucasian and 6% as Haitian. In the control group, only 15 students responded to the survey. Thirty-three percent categorized themselves as African-American, 60% as Hispanic, and 7%, as White non-Hispanic or Caucasian.

Forty-seven percent of the students in the experimental group were females and 53% were males. In the control group, 41% were females and 59% were males.

The average age of students in the experimental group was 22. Fifty-nine percent of the students were between 18 and 20, 17% between 21 and 23, and 24% between 27 and 38. In the control group, the average age of students was lower, 20. Sixty-seven percent were between 18 and 20, 27% were between 21 and 23, and one student (6%) was 38.

Seventy-six percent of the students enrolled in the experimental group had come from lower-level developmental courses, while 60% had come from these courses in the control group. In the experimental group, 6% were referred to the Learning Disabilities Lab and 71% were referred to the Writing Lab for further one-on-one tutoring in grammar and other writing deficiencies. In the control group, no students attended or were referred to the Learning Disabilities Lab and 40% were referred to the Writing Lab for further assistance. Therefore, at entrance, students in the experimental group seemed to be more underprepared than students in the control group.

About the Software

Please see a description of Realtime Writer provided in Appendix C.

The Design

This follow-up study sought to determine what effect the use of a social, interactive program, Realtime Writer (RTW), had on student writing. It differed from the previous study in one primary way: the only CAI program that students were exposed to was RTW. Students were not introduced to the word processing program (Microsoft Write).

The major reason for including only RTW was that it seemed important to explore whether use of an informal computer program along with formal classroom instruction would have a significant effect on the writing of developmental students. It also appeared interesting to investigate whether an increase in essay length was an effect of using a word processing program and RTW combined, as in Tixier and Lamazares' study, or whether it could be attributed to the fluidity that students acquired through their experiences with RTW.

Another reason for using RTW alone was that I had discovered, in the Spring and Summer Terms when I did use the word processing program, that a great deal of time was spent on the operational, mechanical tasks of teaching students formatting and editing commands instead of on discussions of the actual writing. Using RTW seemed far less cumbersome in this respect since commands are few and easy for students to understand, and learning is centered more around content than around form.

The original proposal sought to measure writing improvement through a comparison of final essay scores of the experimental and control groups. This was assuming that students came in at the same level and had the same cognitive grammatical and developmental

distance to travel during the course of the term. However, as is indicated in the summary of student background, this was not the case. Students in the experimental group came to the course with considerably more writing deficiencies than did students in the control group. Therefore, the decision was made to measure differences in *improvement* rather than in final essay scores between the control and experimental groups. This method seemed to be a more accurate way of measuring writing improvement since students enter classes with differing levels of writing proficiency.

With this perspective in mind, the study was undertaken to discover how much of the writing of students attending the EC (experimental group) and using RTW on a regular basis improved and how this improvement was similar to or different from the improvement in the writing of students not attending the EC (control group). As in the previous study, gains were measured analytically (holistic essay scores, CAMELOT Type 5 feedback forms), affectively (Writing Apprehension Test), and behaviorally (retention).

Gains in writing proficiency were measured analytically through the use of pre- and post-tests (The College Board's Computerized Placement Tests, or CPT's) and through the use of diagnostic and final essays, evaluated holistically, for both groups. In addition, writing improvement was observed in terms of the number of comments given on the CAMELOT Type 5 feedback form for an end-of-term paper based on the substance of a reading discussed on RTW by the experimental group and discussed in a traditional classroom setting by the control group.

Changes in writing apprehension for both experimental and control groups were measured with the same instrument used in the previous study (Daly and Miller's Writing Apprehension Test).

Student retention was measured by comparing the number of students who took the departmental essay examination at the end of the term with the number of students appearing on the third class roll for the term as in the previous study.

The effectiveness of RTW as a classroom research and instructional tool was also assessed by observational means. I kept a diary documenting student attitudes, classroom management concerns, and affective observations.

No more than one weekly class session was held in the EC. The other sessions took place in the regularly assigned classroom. All timed in-class, holistically scored essays were written in the regular classroom. Both experimental and control groups took their departmental exams during the same week, under the same testing conditions.

RTW was used each time students met in the EC for a total of seven times during the term. It was not feasible to hold class in the EC once a week because the use of the same program sixteen times during the semester would have proven monotonous, would not have provided sufficient opportunity for instruction that does not lend itself to the structure of RTW, and therefore would not have allowed sufficient time for the completion of the departmentally required in-class timed writing.

Realtime Writer was used primarily for discussion of reading passages (two to three students grouped on one channel and all students and the teacher on the same channel), peer feedback on essays (two students grouped on one channel), and completion of exercises dealing with essay development (two to three students grouped on separate channels).

Monitoring the Study

Students in both classes used the same book, *College Writing Skills With Readings* by John Langan, wrote the same number of in-class timed essays, and received CAMELOT Type 5 feedback for the same essays. Material covered was the same for the most part, with the exception that there was less time to spend on

grammar instruction with students in the experimental group.

Copies of RTW dialogues that students in the experimental group had written in previous class sessions were returned to students with my comments written in the margins.

Although I expected and was looking forward to the change that occurs in locus of control in any computer classroom, I found it difficult to adjust to. It seems that by design this type of learning environment requires that students take more responsibility for their learning than in the more traditional classroom setting, for they are responsible for the pacing of their discussions, the depth and thoroughness of their responses, and the amount of critical thinking and reasoning that they undertake without receiving as much immediate instructor feedback. Students coming from developmental programs are often used to working not only with an instructor but also with tutors to assist them with the completion of classroom tasks. In this regard, the responsibility of the learning task that RTW placed on them was new. This led to some confusion on their part and mine at first, and to subsequent changes in lesson plans.

The sense of confusion on my part was also due to the fact that I had never received any formal training on the operation of RTW or on proven teaching strategies that would be most effective with RTW. This led to some degree of uncertainty regarding which lesson plans would suit the program best. As a result, I found that the time required to plan classes to be held in the EC was greater than that required to plan my other courses.

However, my experience in the EC did provide me with a first-hand understanding of what is required to introduce CAI into my curriculum and with a desire to contribute to the design of a computer-assisted English curriculum at Miami-Dade Community College. Most rewarding of all was the enthusiasm (despite any problems) that students displayed toward the learning task as they sat before their individual screens. The realization that CAI should be offered to all students enrolled in composition courses as an alternative way of learning was an important one for me as well.

Student Outcomes

Positive Qualitative Observations

- When discussing their essays on RTW, students provided each other with specific comments on content, organization, and effective transitions; in these discussions, they were likely to focus on each other's writing in terms of strengths and weaknesses. They were more hesitant to provide feedback about grammar.
- Students were "tough" in evaluating one another's writing and were assertive by giving one another definite feedback. Perhaps this attitude is attributable to the fact that students are not physically facing each other and are thus more anonymous during the task and that there is no opportunity for nonverbal feedback (body language, tone of voice).
- Students negotiated the terms of improvement for their essays, becoming less defensive and apprehensive about receiving constructive feedback as the discussion progressed.
- Students discussed the need to stay on task and negotiated the best strategies for completing the assignment.
- Students seemed more willing to thank each other after the completion of a task than they do in traditional classroom settings.
- Contrary to what I had expected because of my experience in the Spring Term and because of what the literature reports, there were few instances of derogatory, distracting, and insulting comments in student dialogues.
- Outside the EC, in the regular classroom setting, students in the experimental group showed more of a willingness to ask each other for feedback and to ask a wider variety if students in the class for feedback than did students in the control group.

- Students were often anxious to receive the RTW dialogue printout.

- Through reading the RTW dialogues, the instructor is able to "listen in" on the dynamic involved in group work in a less intrusive manner than in the traditional classroom. Formative evaluation then becomes available at a level not accessed in other traditional small-group settings.

- Toward the end of the term, students were more willing to stay on task than at the beginning of the term. Perhaps this was because they had already worked out the confusion discussed above.

- Of necessity, students have to be active participants in the dialogue. There is less of an opportunity for one student to take over and one to withdraw, especially when working in dyads.

- When requesting classroom feedback on RTW, I found that students were able to provide specific comments about the content of the learning.

- Students reported the following:

    - They enjoyed expressing themselves. (DIALOG 9/23/91)

    - The best thing they liked was communicating and working together in a different way; it was better than being in class. (DIALOG 9/23/91)

    - The atmosphere in the EC was enjoyable and comfortable. (DIALOG 10/14/91)

    - Their relationship with the other students was fun. (DIALOG 10/14/91)

    - They would like to continue coming. (DIALOG 10/14/91)

Less Positive Qualitative Observations

- Students in the experimental group seemed to make a less clear distinction between formal and informal writing than did students in the control group. Perhaps this is attributable to the fact that when RTW is used, informal writing is stressed.

- Because their names appear on RTW printouts once students type in a comment, the element of anonymity required for some classroom research tasks is missing.

- If students are absent for a discussion on RTW, they can't make up the work missed as they can with a word processing program.

- When the entire class is working on one channel, discussions are ineffective. Some students don't participate at all; others get into dialogues with one another and ignore the assignment as it is "directed" by the instructor; students who come in late disrupt the flow of the discussion because they are asking for instructions on the screen; students who have little keyboarding skills have difficulty keeping up with the discussion.

More Positive Qualitative Observations and Some Final Concerns

- The staff of the EC was knowledgeable and always willing to help; student responses to staff were positive.

- The development of a handout by the EC staff instructing students on how to get in and out of RTW proved to be a useful reference guide.

- When putting students on channels (assigning them to work in particular groups), should the instructor determine who will work with whom? The RTW classroom setting seems to lend itself to this type of assigning, although this is not usually the case in traditional classrooms where students participate in collaborative learning activities.

- When switching from channel to channel and "listening in" on student discussions, is it appropriate for the instructor to advise students that s/he is "listening in"? Is the teacher interfering with the flow of discussion by doing this?

- Are the dialogues for the teacher to read?

Quantitative: Writing Improvement

Camelot Type 5 feedback forms which give feedback to students on 13 categories, were used with a final essay assigned to both groups. Of these 13 categories, 9 relate to mechanical and sentence problems and 4 to essay development and organization mistakes.

Students in the experimental group received fewer overall comments, 27, than did students in the control, 39 (Table I). These numbers suggest that students in the experimental group were making fewer errors in their writing by the end of the term. However, when the average number of comments per paper was tabulated, this difference did not seem to be as significant, with 2.3 average comments per paper in the experimental group and 2.6 comments per paper in the control.

It is also important to note that 37% of the comments in the experimental group focused on content and organization, while only 18% of the comments focused on these skills for the control group. This seems to contradict the results that might be expected, since students in the experimental group spent more time (on RTW) providing feedback to each other regarding the organization, development, and content of their writing than did students in the control group. However, it is important to note that, as stated at the outset, both of these groups came in with differing levels of proficiency and that, therefore, looking at just the final essay might not be the best way to assess improvement. Results that measure changes in writing through pre- and post-testing would seem to provide a more accurate account of improvement.

A measure that did provide for pre- and post-testing to determine writing improvement was The College Board's CPT taken by students in both control and experimental groups. As shown in Figure 1, the experimental group showed greater improvement between the pre- and post-tests, increasing their scores by an average of 14.6 points, than did the control group, increasing their scores by an average of 3.5 points.

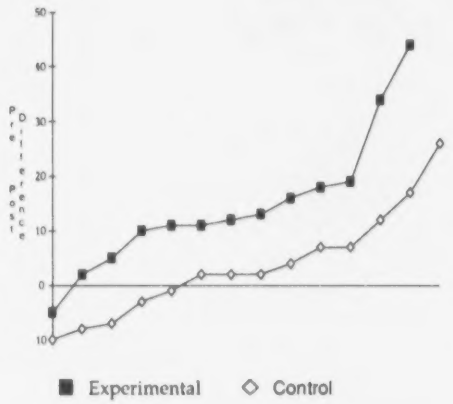

Figure 1: *CPT Difference Scores for Experimental and Control Groups*

Table I

CAMELOT Type 5 Feedback Form

Group	*No. of Comments*	*Average No. of Comments Per Paper*	*Mechanics*	*Development*
Experimental	27	2.3	17	10
Control	39	2.6	32	7

The third quantitative measure used to observe writing improvement was the holistically scored diagnostic and departmental essays. Figure 2 plots the changes in writing improvement between the diagnostic and the departmental exam for each student.

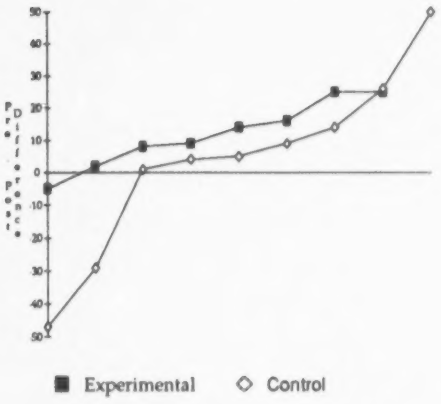

Figure 2: *Holistic Writing Difference*

Diagnostic essays were scored by two readers, one being the instructor. Departmental essays were scored by two readers as well, neither of whom was the instructor. Here, as in the CPT, students in the experimental group showed greater gains than did students in the control group.

Table II shows how the experimental group compared to the control group and other sections. Here, students in the experimental group showed a greater passing rate of 93%, compared to 86% for the control group and 84% for other sections. It is not surprising that most students in the experimental group did not score in the upper levels since this group started with substantial writing deficiencies. It is surprising, however, that the failure rate for this group was lower than that for the control group and all other sections.

Quantitative: Writing Apprehension

Students in both control and experimental groups were asked to fill out pre- and post-test forms of the Writing Apprehension Test developed by Daly and Miller. Unfortunately, scores for both pre- and post-tests were not available for all students who filled out forms because of mistakes in bubbling and failure to complete the questionnaires. The higher the score, the more confident the student is about writing. A positive difference between pre- and post-test scores shows that students have become less apprehensive or more confident about writing. The changes in writing apprehension are graphed in Figure 3.

Table II

Comparison of Holistic Scores Of
Experimental & Control Groups and Other Sections

Holistic Scores	*Experimental N=14*	*Control N=15*	*All Other Sections N=867*
12	-		<1%
11	-		2%
10	-	13%	3%
9	14%	13%	8%
8	7%	13%	13%
7	43%	7%	18%
6	29%	40%	40%
5	-	-	-
4	7%	14%	12%
1-3	-	-	4%

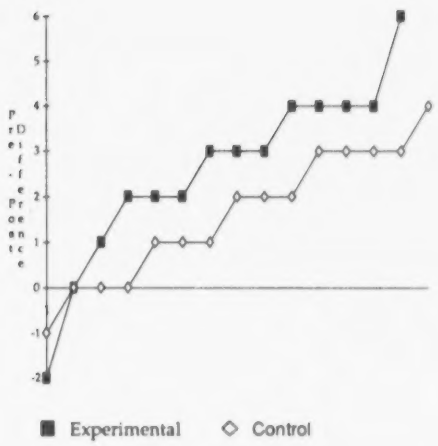

Figure 3: *Writing Apprehension*

Again, it seems that students in the experimental group became less apprehensive about their writing than did students in the control group. However, because of the few numbers of students completing the survey, it is difficult to make generalizations.

Quantitative: Retention

As in the previous study, student retention was measured by comparing the number of students who took the departmental essay examination at the end of the term with the number of students appearing on the third class roll for the term. However, this does not seem to reflect the accurate retention rate since some students appeared on the third official class roll but were "no shows." In the experimental group, the official roll shows 19 students, but only 17 attended class regularly. Similarly, in the control group 17 students attended regularly, while the official class roll shows 20. Another point of concern centers around students who remained in class until it was time to take the departmental essay exam but were advised not to take this final exam because their skills had not sufficiently improved to complete it successfully. Two students in the experimental group and 2 in the control group were advised in this manner. These students, although appearing as withdrawals on the final class roll, should have been considered retained, given that they stayed until the final exam. The retention and failure rates shown in Table III do not take into consideration the students not showing up for class or the students who were advised not to take the final exam. The failure rate refers only to the students who took the final. The experimental group showed a low failure rate when compared to both the control group and other sections.

Recommendations

For the Lab

Keyboarding programs need to be provided for students whose ability to function effectively in RTW is hampered by a lack of keyboarding skills.

For the Faculty

Faculty need to be aware that they will have to redesign their courses in order to teach in the EC.

Faculty should be aware that, although getting students to work on RTW is not difficult at first, planning effective lessons to be completed on

Table III

Comparison of Retention and Pass Rates in ENC 1100

Group	*Retention Rate*	*Failure Rate in Dept. Exam*	*N*
Experimental	74%	7%	19
Control	75%	13%	20
All Others	88%	14%	989

RTW takes considerable amounts of time and lots of trial and error.

When deciding on software to use in the EC, faculty should consider using both Microsoft Write and RTW so that they may provide their students with both formal and informal writing contexts in the computer classroom.

The use of RTW as a classroom feedback instrument should be further explored.

For Administrators

CAI is an unavoidable and exciting reality in classrooms everywhere.

Faculty need on-going training and mentoring and additional time for practice, experimentation, and planning of course activities and instructional methods.

Because of the enthusiasm of students as well as of instructors working with RTW, and because of the positive results of this and previous studies regarding the impact of CAI on the writing of developmental students, it seems reasonable to recommend that all students enrolled in developmental courses be exposed to the Electronic Classroom and that faculty training in the use of instructional software be continued and expanded.

Use of PLATO for Math

William Hajdukiewicz has taught at Miami-Dade Community College for 22 years, 12 years in Community College Studies and 10 in Developmental Studies. He received his B.S. in Science Education from Clarion University in 1956 and his M.A. in Education from Mississippi State University in 1964.

The Setting

Rationale for Continuing the Study

My first study of the use of PLATO with remedial math students, completed during the Winter Term of 1991 (January-April), showed positive results. The replication of the study did not show the same positive results, leading to serious questions about the differences between the studies.

The first study was an investigation to determine if computers with appropriate mathematics software could better serve the needs of the lower-ability math student as a supplement to regular classroom activities than does the college tutorial Math Lab. The experimental students made significant improvements which raised my interest in replicating the study. My findings in the first study for students in the experimental group who used in the Electronic Classroom, when compared to the control group who used the Math Lab, include the following for the experimental group:

- Greater percentage gains in the differences between departmental pre- and post-tests.
- Greater number of satisfactory grades (successful course completions).
- A higher percentage (18%) of experimental students increasing their scores by 30% or more.
- Most noteworthy, a much lower percentage of course withdrawals for the experimental group (10%) compared to those for the control group (31%).

About the Course

MAT 0003 (or College Preparatory Arithmetic) is the lowest level of two college prep math courses. The course requires competency in the basic computational math skills in whole numbers, primes and multiples, fractions and mixed numbers, decimals, ratio and proportion, and percent. The other preparatory math course is MAT 0024 (or College Preparatory Algebra). The college is currently in the process of implementing a new course, MAT 0026, intermediate between MAT 0003 and MAT 0024.

MAT 0003 is a four-credit course that does not count toward graduation. It consists of 48 hours of classroom instruction and 32 hours in the Math Lab. Classroom instruction consists of lectures with student participation. The math lab provides tutorial help, video and audio tapes, and computer tutorial software. The text used is *Arithmetic* (5th edition) by Barker, Rogers, and Van Dyke (Saunders Publishing Company). Areas of study include whole numbers, primes and multiples, fractions and mixed numbers, decimals, ratio and proportions, and percents. Student are evaluated on 6 unit tests plus a final exam (exit test). The student must score at least 70% to be classified as competent for any given assignment or test. Students are given a chance to make up any test that they missed or failed. Final grades are recorded as S (Satisfactory, student passes), P (Progress, but course must be repeated), and U (Unsatisfactory, course must be repeated, and grade is averaged as an F).

The State of Florida requires the first-time-in-college student to take an entry-level placement examination. At Miami-Dade Community College, the Multiple Assessment and Placement Services (MAPS) test is used to meet state requirement. Students with a MAPS raw score between 0 and 24 are required to start their math program with MAT 0003, College Preparatory Arithmetic.

At M-DCC's North Campus, the MAT 0003 student is required to take a departmental diagnostic test on the first day of class. This test is given to verify the results of the MAPS test and to give the instructor a feeling for the basic math ability of each class he or she is to teach. The college requires that all math students in the college prep courses attend the lab at least 32 hours per term along with their regular class attendance. In the lab students may work on their own, but if they should need help, instructors and tutors are present to give assistance. The instructors are assigned to the Math Lab by the department chairperson; tutors are hired by the Lab supervisor from a corps of higher-level math students at the college. In addition to tutorial services, a videotape of each chapter in the work book is provided for students; the Math Lab also has some computers and software.

About the Students

Based on the positive results in the previous study, I selected two of my MAT 0003 classes for this second study. All students in the experimental group used the PLATO software in the Electronic Classroom, while students in the control group used the Math Lab for their required 32 hours in a lab.

The experimental group started with 38 students. In this group, 50% claimed they are Black or African-American, 45% stated they are White, and 5% indicated they are Asian. English is the primary language for about 60% of the students in the group. The average score on the departmental diagnostic test was 34; on the CPT pre-test, the average was 31.

The control group also began with 38 students. This group was made up of 60% Blacks or African-Americans and 40% Whites. Most of the students in this group (64%) claimed English as their primary language. The average score for this group on the departmental diagnostic test was 37; for the CPT pre-test, the average was 36.

About the Software

Please see a description of PLATO provided in Appendix C.

The Design

Rather than selecting students from different sections of my MAT 0003 classes as in the first study, I elected to use one of my classes as the experimental group and one as the control group. All the students in my experimental group were required to use the Electronic Classroom for their lab work, while the students in the control group used the Math Lab. Students in the experimental group were not introduced to the Math Lab and those in the control group were not introduced to the Electronic Classroom and the PLATO program.

In this replication study, there were no changes in the operation or facilities of the Math Lab, nor were there any changes in the PLATO materials and how they were used. The only significant changes made in this second study were in the selection of the experimental and control groups. Instead of giving students an opportunity to volunteer for the PLATO program, I selected an entire class section as the experimental group because the class schedule coincided with the Electronic Classroom schedule. One of the other class sections with a similar number of students was selected for the control group. As the instructor for both sections, I planned the same classroom activities for both classes. The assumption was made that the groups were basically identical because of the college placement process, the Multiple Assessment and Services (MAPS) test, for these courses. Thus, the selection process was different from that of the first study because all students in the previous experimental group were pre-tested for lower math ability using the departmental diagnostic test score and, perhaps most significantly, they were all enthusiastic volunteers.

The Computerized Placement Test (CPT) pre- and post-tests, the departmental diagnostic, and the final grade would be used to evaluate student performance in both groups.

For the students in the experimental group, I constructed a PLATO program which consisted of 7 math units called "routing activities" in the PLATO Software (see Table I). Each routing activity is divided into "modules," and each module is then subdivided into a tutorial lesson, a drill-and-practice sequence, and 2 to 4 tests. It was estimated that the student could complete the assigned modules in 32 hours (or less) of computer time. Students are allowed to select which routing activity they are going to work on at a given time, but I encouraged them on a weekly basis to work on the units that the class was working on.

Table I

Structure of PLATO Program

Routing Activity Name	*Number of Modules*
Whole Numbers Part I	21
Whole Numbers Part II	21
Primes and Multiples	2
Fractions	17
Decimals	7
Ratio and Proportion	2
Percent	5

The students in the control group were also required to spend 32 hours in the Math Lab. Here students may work on their own, but instructors and student tutors are provided should the student need help. In addition to the tutorial services, a videotape of each chapter in the workbook is provided for students.

Monitoring the Study

Each semester, I encourage my students to take advantage of the services provided in our labs. For the students in my experimental group, I used the weekly printout of their lab activities to advise students about their lab work. The PLATO weekly report does provide substantial information about student activity, what particular modules students worked on, how they performed, and if they are experiencing any difficulty. Due to my increased involvement with students in the experimental group in the second study, almost all my students were able to complete all 7 routing activities in PLATO. I kept reminding them that they had to complete all the routing activities before the end of the term. On several occasions, I would also ask some students to meet me in the Electronic Classroom when they seemed to be having problems or difficulty with some modules in PLATO, or I would walk over to the Electronic Classroom with students at the end of a class session. Students were asked to write how they felt about using the Electronic Classroom and the PLATO program; most stated that they liked the PLATO program and that it really helped them. I also discussed how they were doing as a group on a weekly basis.

Student Outcomes

The second study resulted in the control group's outdoing the experimental group in almost every category:

- Greater number of satisfactory grades (53%) compared to those in the experimental group (42%).
- Fewer withdrawals (13% compared to 23.5%)
- More students who registered gains of 30% or more on departmental diagnostic and final tests.
- Greater point gain in their average CPT pre- and post-tests.

In the second study, most of the conclusions and findings of the first study were reversed. The control group scored higher in most of the positive categories. For example, students in the control group (N=26) increased their scores on the pre- and post-departmental exam by 33%, compared to the experimental group's (N=22) 30%. On the CPT pre- and post-tests, the control group (N=27) gained an average of 18 points, while the experimental group (N=27) improved by only 11 points. Figure 1 shows the difference between CPT pre- and post-test scores for students in each group. None of the students in the control group had a negative point gain, while five students in the experimental group had a negative point gain.

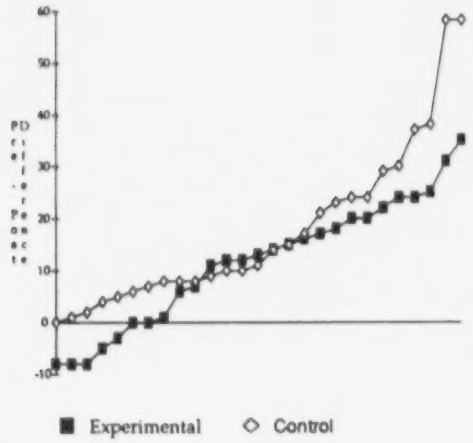

Figure 1: *CPT Difference Scores for Experimental and Control Groups*

An even more alarming result was the amount of time spent and the number of PLATO lessons completed by the experimental group. The students in the second experimental group did not do as well on the final exams as did the experimental students in the first study, even though they completed almost three times as many PLATO modules (45% compared to 16%). Table II shows the number of routing activities completed and total time spent by students in the experimental group.

It is not clear why some students completed all the assigned modules in PLATO but earned only a progress grade. Final grade distribution for both groups is shown in Table III. More students in the control group obtained satisfactory grades, but this group also started with a higher average on both the departmental diagnostic test and the CPT pre-test (37, 36) than did the experimental group (34, 31). There are more unsatisfactory grades in the control group (29%) than there are in the experimental group (21%), but a greater number of students withdrew from the experimental group.

Table II

Time Spent On PLATO Activities

Student Number	*Finished*	*Started*	*No Work*	*Time Hrs: Mins*
# 1	7	0	0	11:35
# 2	7	0	0	64:18
# 3	-	-	-	-
# 4	1	1	5	6:42
# 5	2	2	3	13:35
# 6	7	0	0	31:13
# 7	7	0	0	26:19
# 8	7	0	0	27:09
# 9	2	2	3	27:04
# 10	-	-	-	-
# 11	7	0	0	18:45
# 12	7	0	0	19:56
# 13	1	1	5	2:00
# 14	7	0	0	28:19
# 15	1	1	5	7:59
# 16	7	0	0	10:04
# 17	7	0	0	44:49
# 18	1	6	0	8:10
# 19	1	1	5	6:56
# 20	7	0	0	10:11
# 21	-	-	-	-
# 22	0	0	0	0
# 23	-	-	-	-
# 24	7	0	0	11:11
# 25	4	3	0	28:40
# 26	1	1	5	5:23
# 27	0	1	6	3:00
# 28	7	0	0	31:42
# 29	1	1	5	7:31
# 30	7	0	0	61:23
# 31	7	0	0	38:28
# 32	7	0	0	26:21
# 33	6	1	0	8:15
# 34	7	0	0	19:17
# 35	5	2	0	20:45
# 36	7	0	0	18:33
# 37	0	2	5	5:21
# 38	2	2	3	5:53

Table III

Final Grade Distribution

Grade	*Experimental Group N=38*	*Control Group N=38*
Satisfactory	(42%)	(53%)
Progress	(13%)	(5%)
Unsatisfactory	(21%)	(29%)
Withdrew	(24%)	(13%)

Table IV

Gain Scores in Pre- and Post-Departmental Tests

Range of Gain Scores (% points)	*Experimental Group (N=38)*	*Control Group (N=38)*
Up to 30	45%	35%
30 or more	55%	65%

Table IV shows the range of percentage gain in scores on departmental diagnostic and final tests. More students in the control group gained 30% or more, while more students in the experimental group gained 30% or less.

Figures 2 and 3 show the amount of time students spent in their respective labs. The average time spent by students who obtained a satisfactory grade in the control group was 38 hours, while those in the experimental group spent only 22 hours. It is appears that there is some efficiency in learning in the Electronic Classroom.

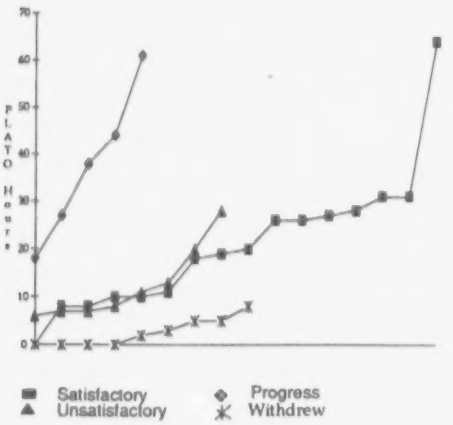

Figure 2: *PLATO Hours and Final Grade for the Experimental Group*

For those with a grade of progress, the control group students spent an average of 42 hours; those in the experimental group, an average of 37 hours. One major concern is that 4 of the students in the experimental group who made a progress grade completed all required modules in PLATO. More students in the control group spent more than the 32 required hours in the Math Lab.

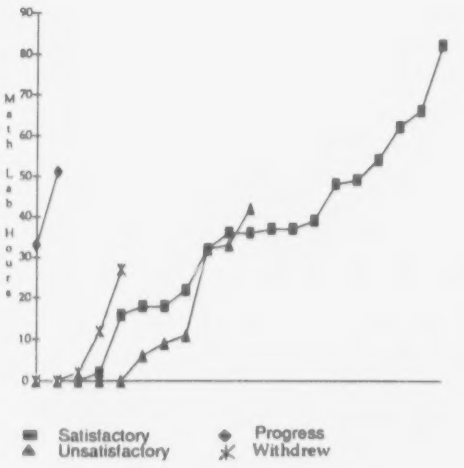

Figure 3: *Math Lab Hours and Final Grade for the Control Group*

Recommendations

From my first study, it is obvious that PLATO made a significant difference in students' performance, and my assumption was that it should have similar impact on all my students without regard to the degree of their initial math ability or method of selection. However, from the results of the second study, it seems that more fine-tuning is needed in structuring the PLATO routing activities to better accommodate the needs of all students in MAT 0003, especially the repeaters. It seems that more modules need to be added because the average completion time for most students is less than 32 hours, which is less than the average time spent by the students who earned a satisfactory grade in the control group.

- Students should be given an opportunity to volunteer for the PLATO program rather than be assigned.
- At least 1 1/4 hours of math lab time should be assigned to the PLATO math program in the Electronic Classroom. A math tutor or math instructor should be present at this time so that math questions can be answered.
- More modules should be included in the PLATO math program. If possible, modules from other networked programs could be included. There are some excellent software programs (not now networked) that might also be programed into PLATO.
- A quiz (based on questions from the PLATO math modules and never more than 10 questions per test) could be given after the student completes a routing activity. If the score is less than 60%, the student should be required to redo the routing activity, do a supplemental software package, and do a supplementary worksheet and other materials.
- After each routing activity, give an essay question on how the student feels about elements in the PLATO program.
- Meetings with all faculty members participating in Project SYNERGY should be arranged periodically.

Part Three: Future Activities

The groundwork for future activities of Project SYNERGY was laid at an intensive five-day meeting held at the IBM conference facilities in Palisades, New York (March 11-15, 1991). Attending the planning meeting were the following:

Project Team

Kamala Anandam
Ed Eisel
Lorne Kotler
Victor Nwankwo

IBM

Larry England
John Morgan

Faculty from Steering Committee Institutions

Linda Brady, Miami-Dade Community College
Katherine Gonnet, Richland College
(Dallas County Community College District)
Pat Jonason, Johnson County Community College
Brenda Lackey, University of Tennessee at Martin
Ben Lowery, Grambling State University
Dorothy Stanley, Bakersfield College (Kern)
Martha Stearns, Central Piedmont
Community College

Four major projects were proposed as follow-up activities to Project SYNERGY:

- Continuation of software reviews to include multimedia, and ESL and study skills/critical thinking.
- Development of a computerized bank of test questions such that the questions will match the Project SYNERGY objectives used in the review process.
- Establishment of Project SYNERGY Centers for Software Implementation to implement software and conduct evaluations of its impact on student retention and learning.
- Development of an integrated management system to support the delivery of instructional software for underprepared students and monitoring of student learning.

The Steering Committee that met at Palisades on March 15, 1991, approved the four projects and endorsed Miami-Dade Community College to seek external funding. To address the first three recommendations, we submitted a new $1.3 million proposal to IBM to fund *Project SYNERGY II* as a 2 1/2 year extension of Project SYNERGY. The proposal was approved by IBM in November 1991, as well as by Miami-Dade Community College's Board of Trustees in December 1991. Consequently, Project SYNERGY II was officially launched in January 1992 and will continue through June 30, 1994. All of the League institutions, Grambling State University, and the University of Tennessee at Martin elected to continue with Project SYNERGY II, and two new schools have been added — Appalachian State University in North Carolina and Macomb Community College in Michigan. To address the last recommendation, we have submitted a separate proposal to the federal government and are awaiting approval.

Project SYNERGY II

Software Reviews

Each participating institution has nominated between 2 and 5 faculty members to review software during Project SYNERGY II in the five disciplines for a total (as of this report) of 15 in reading, 18 in writing, 17 in math, 16 in ESL, and 24 in study skills/critical thinking. Multimedia packages will also be reviewed. Many of the Project SYNERGY II reviewers are "veterans" from Project SYNERGY. Each faculty member is expected to review at least fourteen midrange software packages (each roughly equivalent to half a college textbook). In continuing the review of software in reading,

writing and math, the primary aim will be to raise the number of reviews per package to three for those packages which have already been reviewed, although this goal does not preclude special requests to review new packages that are seen as promising.

For ESL and study skills/critical thinking, faculty reviewers have assisted in drawing up and reviewing new objectives. They attended a two-day workshop in Miami on March 26-27, 1992. In preparation for the workshop, Miami-Dade Community College faculty developed a preliminary draft of the learning objectives which was discussed. All revisions were incorporated into the second draft and have been sent to faculty reviewers for comment.

Testbank Question Writing

Faculty teams have been established for reading, writing, and math to write questions, check them for quality and validity, and enter them in a computerized test bank system. Participating institutions have nominated one, two, or three faculty for a total (as of this report) of 10 in reading, 16 in writing, and 16 in math. Each team also has a Discipline Coordinator at Miami-Dade Community College (Reading, Don Meagher, North Campus; Writing, Melinda Prague, Wolfson Campus; Math, Norma Agras, South Campus). The guidelines for writing questions and a description of the management details for coordinating this activity have been sent to the question writers.

Centers for Software Implementation (CSI's)

In the first year of Project SYNERGY II (1992), two CSI's will be established, one at Bakersfield College in California and one at Miami-Dade's Wolfson campus. During 1993, three more CSI's will be established, one at Dallas County Community College, one at the University of Tennessee at Martin, and one at Miami-Dade's Medical Center Campus. Miami-Dade will serve as the coordinator of these centers.

The CSI's will validate the Software Implementation Model that has emerged during the pilot at Miami-Dade's North Campus. They will also serve as models for implementation, conducting research studies to determine the impact of the technological solutions they use and the ways to enhance the impact. The research will include formative evaluation, which allows for refining the implementation strategies in order to get maximum benefit for student learning.

Miami-Dade, because of its experience in establishing a Project SYNERGY CSI prototype at the North Campus, will conduct workshops for the staff of other CSI's and will provide guidelines for on-going faculty development and formative evaluation. We have produced a videotape to explain and document the Software Implementation Model. A primary intention will be to progressively improve the evaluation process and involve more and more faculty such that the implementation becomes institutionalized.

Proposal for an Integrated Management System

On January 24, 1992, Miami-Dade Community College submitted an application for a federal government Title III (Strengthening Institutions Programs) grant. The proposal requests $2.3 million over a five-year period to fund a project called *Learning Environment 2000 for Underprepared Students*. The centerpiece of this learning environment is Project SYNERGY Integrator, an integrated management system that will manage the delivery of appropriate instructional software to underprepared students to overcome their deficiencies and monitor student mastery of objectives. If funded, the project will begin on October 31, 1992, and continue through September 30, 1997. We will rely heavily on all the participants of Project SYNERGY II for their input and feedback in finalizing the design for Project SYNERGY Integrator.

Appendix A

Software Attributes

Software Content Attributes:

Accuracy (3)
Information is current
There are no factual errors
Content is free of spelling & grammatical errors

Appropriateness (5)
Models and examples are not oversimplified
Content is free of stereotypes & social biases
It includes problem-solving situations of varying difficulty
It provides applications to real-life situations
It is not obscured by jargon or technical terms

Feedback (3)
Content provides explanation of correct answers
It provides alternate explanations
Alternate explanations aim to correct student understanding

Meeting Faculty Needs:

Ease of Implementation (6)
Documentation is provided
It presents ways the package can be used
It provides support materials
It describes how to assess student performance
Software requires minimal teacher time to get students using it
It frees up teacher time from tedious tasks

Adaptability (6)
Software gives individual attention to students as needed
It can be customized for a group of students
It can be customized for a single student
It can be used for independent study
It can be used for peer groups
It can be used for classroom presentations

Summary Information (6)
Software maintains student usage and performance records
It generates summary reports that can be viewed on screen
It generates summary reports that can be printed
It generates summary reports as an ASCII text file
Student data are stored on each student disk
Student data are stored on disk for a class of students

Meeting Student Needs:

Ease of Use (7)
On-line directions are clear, concise, and complete
On-line help is clear, concise, and complete
Student manuals are provided
They are helpful
Student workbooks are provided
They are useful
Software provides status messages to minimize confusion

Adaptability (4)
Software adjusts content based on student responses
It allows branching into different parts of the program
It adapts to the first-time versus the experienced user
It adapts to a range of reading abilities

Testing (3)
Software incorporates pre-tests
It incorporates post-tests
It allows students to leave a question unanswered & go back to it later

Tracking (2)
Software keeps students informed of progress
It provides a summary of performance & suggests what to do next

Interactivity (7)
Software actively engages the student
It provides student feedback
It is tied to the responses and thus is credible and supportive
It explains errors
It suggests corrections of errors
It forgives extraneous errors
It presents relevant practice exercises

Appropriateness (18)
Software allows students to think and solve problems
Examples are appropriate for adult learners
Animation and/or graphics are used
They focus attention on important content and process
They allow coverage of advanced concepts
They are appropriate for adult learners
Sound-effects are used
They focus attention on important content and process
They allow coverage of advanced concepts
They are appropriate for adult learners
Color is used
It focuses attention on important content and process
It allows coverage of advanced concepts
It is appropriate for adult learners
Video is used
It focuses attention on important content and process
It allows coverage of advanced concepts
It is appropriate for adult learners

Software Operations:

Reliability (3)
Software is free of programming errors
It runs with minimum delays
Extraneous input does not disrupt the program

Format (7)
Program maintains a bookmark for reentry
Program allows the student to magnify print
Voice capability is used
The right quantity is presented
It is audible
Inappropriate dialect is avoided
Screens are free of clutter and dense print

Reading Objectives

Word Learning Skills (46)

Word Recognition

Phoneme-grapheme relationships (phonics):

- Vowels — W, S
- Consonants — W, S
- Vowel and consonant combinations — W, S
- Syllabification — W, S
- Emphasis (stress) — W, S
- Compound words — W, S

Basic sight words:

- Word configurations — W, S
- Typical recognition lists (Dolch, Thorndike, et. al.) — W, S

Dictionary Skills

- Order of entries (alphabetizing)
- Guide words
- Parts of word entries
- Diacritical markings
- Selecting an appropriate definition for a word in context
- Using dictionaries with different organizational patterns
- Using the dictionary as a source of information

Context Clues for Word Meanings

- Direct definition or restatement clues — S, P, G
- Punctuation/typographical clues — S, P, G
- Experience clues (reader's knowledge base) — S, P, G
- Example clues — S, P, G
- Summary clues — S, P, G
- Comparison/contrast clues — S, P, G

Word Elements to Define Words

- Prefixes in words — W, S, P, G
- Suffixes in words — W, S, P, G
- Roots in words — W, S, P, G
- Combinations of prefixes, suffixes, & roots — W, S, P, G

New Words in Specialized Groupings

- Occupational/technical words — W, S, P, G
- Academic words from core areas — W, S, P, G
- Words with multiple meanings — W, S, P, G
- Words with similar sounds but different spellings & meanings — W, S, P, G

Correct Spelling

- Applying phoneme/grapheme relationships — W, S
- Applying knowledge of word parts — W, S
- Applying basic spelling rules — W, S
- Developing a personalized system for spelling improvement — W, S

Word Relationships

- Antonyms — W, S, P
- Synonyms — W, S, P
- Homonyms — W, S, P
- Part to whole/whole to part — W, S, P
- Function — W, S, P
- Rhyme — W, S, P
- Attributes (characteristics) — W, S, P
- Spelling — W, S, P
- Member to class/class to member — W, S, P
- Age or size — W, S, P
- Cause/effect — W, S, P
- Creating simple analogies to show relationships — W, S, P
- Solving analogies — W, S, P

W = Word Level S = Sentence Level

Functional Reading (10)

- Understanding signs (enter, exit, smoking in designated areas only, etc.)
- Understanding forms (college registration, etc.)
- Understanding simple instructions (in textbooks, tests, etc.)
- Understanding information found in newspapers
- Understanding information found in restaurant menus
- Understanding information found in telephone directories
- Understanding information found on food labels
- Understanding information found on medicine labels
- Understanding information found in public transportation schedules
- Understanding information found in training manuals

Basic Comprehension (15)

Topic/Main Idea

- Recognizing the stated main idea of a paragraph/passage — P, G
- Recognizing the unstated main idea of a paragraph/passage — P, G
- Formulating the main idea of a paragraph (topic sentence) or of a longer passage (thesis) — P, G

Details

- Identifying the major details of a paragraph/passage — P, G
- Identifying the minor details of a paragraph/passage — P, G

Organizational Patterns

- Sequence — P, G
- Cause/effect — P, G
- Comparison/contrast — P, G
- Definition — P, G
- Example — P, G
- Facts — P, G
- Enumeration — P, G
- Classification — P, G
- Problem/solution — P, G
- Mixed patterns — P, G

Transitional Expressions (9)

- Sequence — S, P, G
- Cause/effect — S, P, G
- Comparison/contrast — S, P, G
- Definition — S, P, G
- Example — S, P, G
- Summary — S, P, G
- Enumeration — S, P, G
- Problem/solution — S, P, G
- Mixed patterns — S, P, G

Critical Comprehension (29)

Author's Purpose

- Writing to inform or explain — S, P, G
- Writing to persuade — S, P, G
- Writing to elicit emotion or mood — S, P, G
- Writing to entertain — S, P, G

Author's Bias

- Bias by proportion (emphasis) — S, P, G
- Bias by a choice of information — S, P, G
- Bias by a word choice's denotation — S, P, G

P = Paragraph Level G = Passage Level

Bias by a word choice's connotation	S, P, G
Euphemisms	S, P, G
Stereotyping	S, P, G
Propaganda techniques	S, P, G
Author's Tone	
Irony	S, P, G
Cynicism	S, P, G
Wit and humor	S, P, G
Sarcasm	S, P, G
Satire	S, P, G
Making Judgments	
Differentiating fact and opinion	S, P, G
Drawing conclusions	S, P, G
Making inferences	S, P, G
Considering the author's qualifications	S, P, G
Considering other viewpoints not expressed by the author	S, P, G
Examining quantity and quality of evidence	S, P, G
Challenging assumptions or analogous relationships	S, P, G
Author's Use of Figurative Language	
Simile	S, P, G
Metaphor	S, P, G
Allusion	S, P, G
Personification	S, P, G
Hyperbole and understatement	S, P, G
Idiomatic expressions	S, P, G

Textbook/Technical Reading (18)

Reading to Study	
Relating text passages to visual/graphic materials	S, P, G
Textbook previewing techniques	S, P, G
Note-taking	S, P, G
Outlining	S, P, G
Mapping	S, P, G
Summarizing/synthesizing	S, P, G
Reading-to-study techniques (e.g., SQ3R)	S, P, G
Locating specific information	S, P, G
Interpreting visual materials	
Charts	S, P, G
Graphs	S, P, G
Maps	S, P, G
Tables	S, P, G
Diagrams/illustrations	S, P, G
Reading for Tests	
Multiple-choice questions	
True/false questions	
Matching questions	
Completion questions	
Understanding key words in essay questions	

Reading in Content Areas (29)

Mathematics	
Surveying the textbook	S, P, G
Applying a reading-to-study technique	S, P, G
Applying vocabulary/memory techniques to learn symbols and formulas	S, P, G
Applying steps in analyzing mathematical word problems	S, P, G
Applying skills for reading visual materials	S, P, G
Social Sciences	
Surveying the textbook	S, P, G
Applying a reading-to-study technique	S, P, G
Applying vocabulary/memory techniques to understand concepts & terminology	S, P, G
Recognizing frequently used organizational patterns	S, P, G
Applying critical comprehension skills	S, P, G
Applying skills for reading visual materials	S, P, G
Sciences	
Surveying the textbook	S, P, G
Applying a reading-to-study technique	S, P, G
Applying vocabulary/memory techniques to understand symbols, formulas, concepts, and terminology	S, P, G
Recognizing frequently used organizational patterns	S, P, G
Applying critical comprehension skills	S, P, G
Applying skills for reading visual materials	S, P, G
Humanities and Literature	
Surveying the textbook	S, P, G
Applying a reading-to-study technique	S, P, G
Applying vocabulary/memory techniques to understand concepts & terminology	S, P, G
Recognizing frequently used organizational patterns	S, P, G
Applying critical comprehension skills	S, P, G
Applying skills for reading visual materials	S, P, G
Vocational/Occupational/Technical Studies	
Surveying the textbook	S, P, G
Applying a reading-to-study technique	S, P, G
Applying vocabulary/memory techniques to understand concepts & terminology	S, P, G
Recognizing frequently used organizational patterns	S, P, G
Applying critical comprehension skills	S, P, G
Applying skills for reading visual materials	S, P, G

Rate & Flexibility (11)

Building reading rate	
Reading phrases rather than individual words	P, G
Skimming techniques	P, G
Scanning techniques	P, G
Flexible reading rates	P, G
Techniques to overcome barriers to flex. reading	P, G
Establishing a purpose for reading	
Using flexible reading rates:	
Skimming techniques	P, G
Scanning techniques	P, G
Making decisions according to purpose:	
Choosing texts according to information need	P, G
Choosing texts according to readability level	P, G
Choosing texts according to level of detail/generality	P,G
Choosing texts according to author viewpoint/bias	P, G

W = Word Level S = Sentence Level P = Paragraph Level G = Passage Level

Writing Objectives

Prewiting (12)

Building Fluency
- Free writing
- Keeping a journal
- Blind writing

Generating/Organizing Information (Ideas)
- Brainstorming
- Clustering and mapping
- Questioning (using lists of questions)
- Engaging in situational writing (case studies)
- Examining developmental models (e.g., definition)
- Responding to readings
- Interviewing
- Reasoning inductively/deductively
- Using sources (appropriate databases)

Writing (25)

Limiting the Thesis
- Sentence completion
- Modeling (illustrations, examples)
- Open-ended options (illustrations used as idea starters)

Organizing/Outlining Information (Ideas)
- Experimentation with original formats/ possibilities (e.g., rhetorical modes) P,E
- Forms and graphic structures to be filled in (e.g., comparison/contrast, process, etc.) P, E
- Classifying P, E
- Establishing priorities P, E
- Clustering and mapping P, E

Composing a Draft
- **Using rhetorical modes:**
- Description P, E
- Narration P, E
- Illustration P, E
- Comparison/contrast P, E
- Cause/effect P, E
- Definition P, E
- Process analysis P, E
- Argument P, E
- Drafting topic sentences
- Drafting thesis statements
- Clarifying main points with supporting details P, E

Achieving Unity and Coherence
- Transitions S, P, E
- Key words (repetitions, echoes) S, P, E
- Synonyms S, P, E
- Antonyms S, P, E
- Subordination S, P, E
- Coordination S, P, E

Revision (12)

Reassessing Expectations
- Audience
- Purpose
- Tone

Evaluating the Draft
- **Thesis:**
- Unity
- Focus
- **Organization:**
- Coherence
- Paragraphs
- Evidence/illustration/details
- **Sentences:**
- Syntax
- Variety
- Combining
- Diction

Editing (25)

Proofreading
- Paragraphing (indenting or blocking)
- Capital letters
- Abbreviations
- Hyphenation
- End punctuation
- Internal punctuation
- Special graphics
- Apostrophes
- Spell-checking

Improving Word, Phrase, and Clause Usage
- Nouns: singular/plural; possessive forms
- Pronouns: singular/plural; possessive forms; subjective/objective case
- Verbs: mood; voice; tenses; infinitives; participles; gerunds
- Conjunctions
- Adjectives
- Articles (definite/indefinite)
- Adverbs
- Prepositions
- Spelling
- Phrases
- Dependent clauses
- Independent clauses

Improving Word Relationships
- Subject-verb agreement
- Noun-pronoun agreement
- Sequence of tenses
- Modification

S = Sentence Level P = Paragraph Level E = Essay Level

Mathematics Objectives

Base Ten Notation (8)

Reading whole numbers and writing in standard notation from zero to one trillion
Writing as a standard numeral a number named by a verbal expression
Rounding a given number to the nearest ten, hundred, or thousand
Using whole number exponents in power notation to represent products
Using whole number products to represent powers with whole number exponents
Writing standard numerals from expanded numerals
Writing expanded numerals from standard numerals
Comparing and ordering whole numbers

Basic Ops/Whole Numbers(10)

Recognizing counting or natural numbers
Recognizing whole numbers
Performing the operation of addition on the set of whole numbers
Performing the operation of subtraction on the set of whole numbers
Performing the operation of multiplication on the set of whole numbers
Performing the operation of division on the set of whole numbers
Estimating sums, differences, products, and quotients of whole numbers
Recognizing number properties
Applying rules for order of operations
Finding square roots of perfect square numbers

Prime Numbers & Factorization (4)

Determining the factors of a given number of reasonable magnitude
Determining prime factorization of numbers of reasonable magnitude
Identifying any prime number less than one hundred
Determining the least common multiple using prime factorization of two or more numbers of reasonable magnitude

Basic Ops/Positive Fractions (19)

Constructing models to represent fractions
Writing equivalent fractions
Simplifying fractions
Comparing fractions
Performing the operation of addition on the set of rational numbers using fractional numerals
Performing the operation of subtraction on the set of rational numbers using fractional numerals
Performing the operation of multiplication on the set of rational numbers using fractional numerals
Performing the operation of division on the set of rational numbers using fractional numerals
Converting mixed numerals to improper fractional numerals
Converting improper fractional numerals to mixed numerals
Performing the operation of addition on the set of rational numbers using mixed numerals
Performing the operation of subtraction on the set of rational numbers using mixed numerals
Performing the operation of multiplication on the set of rational numbers using mixed numerals
Performing the operation of division on the set of rational numbers using mixed numerals
Simplifying complex fractions
Estimating sums, differences, products, and quotients of mixed numbers
Raising fractions to positive integer powers
Finding square roots of perfect square fractions
Applying order of operations rules for fractional numerals

Basic Ops/ Positive Decimals (13)

Constructing models to represent decimal numerals
Comparing magnitude of decimal numbers
Rounding decimal numbers to an indicated place
Expressing a fractional or mixed numeral as a decimal numeral
Expressing a decimal numeral as a fractional or mixed numeral
Performing the operation of addition on the set of rational numbers using decimal numerals
Performing the operation of subtraction on the set of rational numbers using decimal numerals
Performing the operation of multiplication on the set of rational numbers using decimal numerals
Performing the operation of division on the set of rational numbers using decimal numerals
Simplifying complex fractions involving decimals
Combining rational numbers in different notations
Estimating sums, differences, products, and quotients of decimal numbers
Applying order of operations rules

Ratio and Proportions (6)

Constructing models of ratios
Writing ratios
Identifying a proportion
Solving a proportion
Identifying and writing rates including unit rates
Solving word problems using proportion

Percents (7)

Constructing models to represent percent
Expressing percent numerals as decimal numerals
Expressing decimal numerals as percent numerals
Expressing percent numerals as fractional numerals
Expressing fractional numerals as percent numerals
Solving simple percent problems
Expressing statements and questions contained in problems involving percents as number sentences or proportions and then solving the problems

Units of Measure (10)

Recognizing appropriate units of length, weight, and capacity in English System
Converting within English units of length, weight, and capacity
Recognizing appropriate units of length, mass, and capacity in metric system
Converting within metric units of length, mass, and capacity
Converting from English units of length, weight, and capacity to metric units of length, mass, and capacity and vice versa
Simplifying denominate numbers (e.g., 6 ft., 5 in.)
Performing the operation of addition on denominate numbers, i.e., numbers representing units of measure

Performing the operation of subtraction on denominate numbers, i.e., numbers representing units of measure
Performing the operation of multiplying a denominate number, i.e., a number representing a unit of measure, by a rational number
Performing the operation of dividing a denominate number, i.e., a number representing a unit of measure, by a rational number

Basic Geometry (41)

Recognizing parallel lines and their properties
Recognizing perpendicular lines and their properties
Recognizing angles and their properties
Recognizing squares and their properties
Recognizing rectangles and their properties
Recognizing parallelograms and their properties
Recognizing rhombuses and their properties
Recognizing trapezoids and their properties
Recognizing other quadrilaterals and their properties
Recognizing triangles and their properties
Recognizing right triangles and their properties
Recognizing circles and their properties
Constructing models for perimeter to derive a formula for rectangles
Constructing models for perimeter to derive a formula for squares
Constructing models for perimeter to derive a formula for triangles
Constructing models for perimeter to derive a formula for circles
Constructing models for area to derive a formula for rectangles
Constructing models for area to derive a formula for squares
Constructing models for area to derive a formula for triangles
Constructing models for area to derive a formula for trapezoids
Constructing models for area to derive a formula for rhombuses
Constructing models for area to derive a formula for parallelograms
Constructing models for area to derive a formula for circles
Distinguishing between perimeter and area
Computing perimeter of rectangles
Computing perimeter of squares
Computing perimeter of triangles
Computing perimeter of trapezoids
Computing perimeter of parallelograms
Computing perimeter of rhombuses
Computing circumference of circles
Computing area of rectangles
Computing area of squares
Computing area of triangles
Computing area of trapezoids
Computing area of parallelograms
Computing area of rhombuses
Computing volume of geometric figures
Solving applied problems involving perimeter
Solving applied problems involving area
Solving applied problems involving volume

Basic Ops/Signed Numbers (10)

Recognizing integers
Recognizing rational numbers
Constructing model signed numbers
Finding the absolute value of rational numbers
Performing the operation of addition on the set of rational numbers, including negative rational numbers
Performing the operation of subtraction on the set of rational numbers, including negative rational numbers
Performing the operation of multiplication on the set of rational numbers, including negative rational numbers
Performing the operation of division on the set of rational numbers, including negative rational numbers
Evaluating exponential expressions of signed numbers
Applying rules for order of operations on rational numbers

Real Numbers (25)

Reviewing basic arithmetic with positive real numbers, powers, roots
Reviewing order of operations with positive real numbers
Recognizing natural numbers
Recognizing whole numbers
Recognizing integers
Recognizing rational numbers
Recognizing irrational numbers
Recognizing the symbols < and > with real numbers
Recognizing absolute value of a real number
Identifying number line
Performing arithmetic with signed numbers
Using number line for definition of signed number arithmetic
Using rules for definition of signed number arithmeticic
Presenting integer exponents of real numbers
Presenting positive roots of real numbers
Evaluating expressions involving several operations
Evaluating expressions involving grouping symbols
Evaluating expressions involving exponents
Recognizing commutative property
Recognizing associative property
Recognizing distributive property
Recognizing additive identity
Recognizing additive inverse
Recognizing multiplicative identity
Recognizing multiplicative inverse

Set Notation (7)

Recognizing set notation symbol for union
Recognizing set notation symbol for intersection
Recognizing set notation symbol for complement
Finding the union of at least two sets
Finding the intersection of at least two sets
Finding the complement of a set
Drawing Venn Diagrams

Simple Linear Eq./One Variable (7)

Recognizing variables, expressions, and equations
Solving linear equations by addition - subtraction principle of equality
Solving linear equations by multiplication - division principle of equality
Solving linear equations - multi-step
Solving proportions
Solving word problems
Solving absolute value equations

Simple Linear Ineq./One Variable (6)

Recognizing inequalities
Solving inequalities

Recognizing absolute value inequalities
Solving absolute value inequalities
Graphing solutions of inequalities on a number line
Solving word problems

Integer Exponents (9)

Recognizing an integer exponent and variable base
Performing multiplication with integer exponents
Performing division with integer exponents
Simplifying expressions containing negative integer exponents
Performing powers with integer exponents
Recognizing scientific notation
Converting to scientific notation
Converting from scientific notation
Performing arithmetic operations with scientific notation

Polynomials (18)

Recognizing constants, variables, terms, and coefficients
Recognizing a monomial
Recognizing a binomial
Recognizing a trinomial
Recognizing a polynomial
Recognizing the degree of a polynomial
Recognizing the correct order to write a polynomial
Recognizing rules for exponents
Simplifying expressions containing grouping symbols
Evaluating algebraic expressions
Performing multiplication by a monomial
Performing multiplication by a binomial
Performing multiplication by a trinomial
Performing multiplication by a polynomial with more than three terms
Recognizing special product forms
Dividing a polynomial by a monomial
Dividing a polynomial by a binomial
Dividing a polynomial by a polynomial of more than two terms

Factoring (6)

Recognizing factors
Factoring by greatest common factor
Factoring the difference of squares
Factoring trinomials
Factoring the sum and difference of two cubes
Recognizing a perfect square trinomial

Graphs (21)

Recognizing a number line graph
Recognizing the Cartesian coordinate system
Recognizing quadrants
Recognizing ordered pairs
Recognizing ordered pairs by quadrant
Plotting ordered pairs
Recognizing linear equations with two variables
Finding solutions to linear equations with two variables
Graphing a linear equation using a table of values
Recognizing and/or determining x and y intercepts
Graphing a linear equation using intercepts
Recognizing the slope of a line from its equation
Recognizing the slope of a line from the graph of a linear equation
Recognizing the slope-intercept form of a linear equation
Graphing a linear equation using the slope-intercept form
Graphing linear inequalities on the Cartesian coordinate system
Graphing absolute value linear equations on the Cartesian coordinate system
Graphing quadratic equations
Graphing quadratic inequalities
Graphing systems of linear equations
Graphing systems of linear inequalities

Solving Systems of Equations (9)

Recognizing systems of linear equations
Checking solution to systems of two linear equations
Solving systems of two linear equations by graphing
Solving systems of two linear equations by addition/elimination
Solving systems of two linear equations by substitution
Solving applications of systems of two linear equations
Solving systems of two linear inequalities
Solving systems of three linear equations
Solving systems of three linear inequalities

Quadratics (9)

Recognizing the zero factor property
Recognizing the standard form of a quadratic equation
Solving a quadratic equation in factored form
Solving a quadratic equation by factoring
Solving a quadratic equation by using the quadratic formula
Solving a quadratic equation by completing the square
Solving word problems involving quadratic equations
Graphing quadratic equations
Graphing quadratic inequalities

Rational Expressions (5)

Multiplying and dividing rational expressions
Finding the LCD of two or more rational expressions
Adding and subtracting rational expressions
Simplifying complex fractions
Solving equations involving rational expressions

Rational Exponents & Radicals (9)

Converting radicals to nth roots
Converting nth roots to radicals
Performing operations with rational exponents
Simplifying radicals
Adding and subtracting radical expressions
Multiplying and dividing radical expressions
Solving equations with radicals
Recognizing complex numbers
Simplifying expressions containing complex numbers

Geometry (7)

Applying the angle complement and supplement theorems
Applying the sum of the angles of a triangle theorem
Applying theorems on congruent angles formed when parallel lines are crossed by a transversal
Using the theorem on the proportionality of sides of similar triangles to find the length of a side of a triangle
Using the Pythagorean theorem to find the missing length of one side of a right triangle
Finding the perimeters and areas of squares, rectangles, parallelograms, trapezoids, triangles, circles, and other regions made from these geometric figures
Finding the volume of prisms, cylinders, pyramids, cones, spheres, and other solids made from these three-dimensional geometric figures

Appendix B

Software Publishers*

Addison Wesley Publishing Company, Inc.
Consumer Software Support Route 128
Reading, MA 01867
(617) 944-6479

BLS
5153 West Woodmill Drive Suite 18
Wilmington, DE 19808
(800) 545-7766

Britannica Software
345 Fourth Street
San Francisco, CA 94107

Brooks and Cole
511 Forest Lodge Road
Pacific Grove, CA 93950-5098
(408) 373-0728

Brown Bag Software
2105 South Bascom Avenue
Campbell, CA 95121
(408) 559-4545

Bureau of Business Practices
24 Rope Ferry Road
Waterford, CT 06386
(204) 442-4365

Compris
1 Faneuil Hall Market Place
Boston, MA 02109
(617) 742-7235
FAX: (617) 742-3431

Conduit
The University of Iowa Oakdale Campus
Iowa City, IA 52242
(319) 335-4100
(800) 365-9774

D.C. Heath and Company
125 Spring Street
Lexington, MA 02173
(800) 225-1388

Daedalus Group, Inc.
1106 Clayton Lane 248W
Austin, TX 78723
(512) 459-0637

Davidson & Associates
3135 Kashiwa Street
Torrance, CA 90505
(213) 534-4070
(800) 556-6141

Degem Systems, Ltd.
6220 S. Orange Blossom Trail - Suite 316
Orlando, FL 32809
(407) 859-8525

EDL
P.O. Box 210726
Columbia, SC 29221
(800) 227-1606

Educational Activities, Inc.
1937 Grand Avenue
Baldwin, NY 11510
(516) 223-4666
(800) 645-3739
FAX: (516) 623-9282

Educational Design, Inc.
47 W 13th
New York, NY 10011
(800) 221-9372

Educulture
1 Cycare Plaza - Suite 818
Dubuque, IA 52001-9990
(800) 553-4858

Ferranti Educational Systems, Inc.
3700 Electronics Way
Lancaster, PA 17604-3040
(717) 898-0890

Fox Valley Technical College
1825 N. Bluemound Drive
Appleton, WI 54913-2277
(414) 735-5683

H & H Publishers
1231 Kapp Drive
Clearwater, FL 34625
(813) 442-7760

H & N Software
P.O. Box 4067
Bricktown, NJ 08723
(718) 482-5715

Harcourt Brace Jovanovich
7555 Caldwell Avenue
Chicago, IL 60648
(800) 237-2665

Hartley Courseware
133 Bridge Street
Dimondale, MI 48821
(517) 646-6458
(800) 247-1380

Houghton Mifflin
One Beacon Street
Boston, MA 02108
(617) 725-5000
(800) 732-3223

IBM
P.O. Box 1328-W
Boca Raton, FL 33429-1328
(800) 426-3333

Kapstrom, Inc.
P.O. Box 1230
Buda, TX 78610
(512) 295-5103

Krell Software, Inc.
Flowerfield Building #7
St. James, NY 11780
(800) 245-7355

Lexpertise Linguistic Software
380 S. State Street - Suite 202
Salt Lake City, UT 84111
(800) 354-5656

The Math Lab
10893 Leavesley Place
Cupertino, CA 95014
(408) 265-5659

Maxthink, Inc.
44 Rincon Road
Kensington, CA 94707
(415) 540-5508

McGraw-Hill
3017 E. Washington
Iowa City, IA 52245
(319) 351-6329

MECC
6160 Summit Drive North
Minneapolis, MN 55430-4003
(612) 569-1500

Metagraphics Software Corp.
Curtis Center-Independence Square West
Philadelphia, PA 19106-3399
(800) 551-2665

Milliken Publishing Co.
1100 Research Blvd.
St. Louis, MO 63132-0579
(800) 643-0008

*Although we have made every effort to verify this information, some of it may have changed.

National Collegiate Software Clearinghouse
Duke University Press 6697 College Station
Durham, NC 27708
(919) 684-6837 (x.54)

Pacific Crest Software
887 NW Grant Avenue
Corvalis, OR 97330
(503) 754-1067

Parlance Software
542 South Yorktown
Tulsa, OK 74104
(910) 504-4009
(800) 765-6654

Prentice Hall Press
Route 9W
Englewood Cliffs, NJ 07632
(800) 526-0485

Price Laboratory School
University of Northern Iowa
Cedar Falls, IA 50613-3593
(800) 552-6227

Professor Weissman's Software
246 Crafton Avenue
Staten Island, NY 10314
(718) 698-5219

Projected Learning Programs, Inc.
P.O. Box 3008
Paradise, CA 95967-3008
(800) 248-0757

Que Software
11711 N. College Avenue
Carmel, IN 40632
(800) 428-5331

Queue, Inc.
338 Commerce Drive
Fairfield, CT 06430
(203) 335-0906
(800) 232-2224
FAX: (203) 336-2481

References Software, Inc.
330 Townsend Street-Suite 123
San Francisco, CA 94107
(800) 872-9933

Research Design Associates, Inc.
10 Blvd. Avenue
Greenlawn, NY 11740
(800) 654-8715

Samna Corporation
5600 Glenridge Drive
Atlanta, GA 30342-1334
(800) 831-9679

Scholastic, Inc.
730 Broadway
New York, NY 10003
(800) 541-5513

Scott Foresman and Company
1900 East Lake Avenue
Glenview, IL 60025
(708) 729-3000
(800) 782-2665

Skills Bank Corporation
15 Governor's Court
Baltimore, MD 21207-2791
(800) 451-5726

Soft Warehouse, Inc.
3660 Waialae Avenue - Suite 304
Honolulu, HI 96816-3236
(808) 734-5801

SRA Thinkware Products
155 N. Wacker Drive
Chicago, IL 60606
(800) 621-0476

Sunburst Communications
39 Washington Avenue
Pleasantville, NY 10570
(800) 628-8897

TASL
Box 8202 North Carolina State University
Raleigh, NC 27695-8202
(800) 955-8275

Timeworks, Inc.
444 Lake Cook Road
Deerfield, IL 60015
(708) 948-9202

Townsend Press
Pavilions at Greentree
Marlton, NJ 08053
(609) 772-6410

True Basic, Inc.
12 Commerce Avenue
West Lebanon, NH 03784
(800) 872-2742

Tusoft
P.O. Box 9979
Berkeley, CA 94709
(415) 848-9368

Ventura Educational Systems
3440 Brokenhill Street
Newbury Park, CA 91320
(800) 336-1022

VTAE
2564 Branch Street
Middleton, WI 53562
(608) 831-6313

W. Norton and Company, Inc.
500 Fifth Avenue
New York, NY 10110

Wadsworth Publishing Company
7625 Empire Drive
Florence, KY 41042
(800) 423-0563

Weaver Instructional Systems
6161 28 St. S.E.
Grand Rapids, MI 49546
(800) 634-8916

WICAT Systems
1875 South State Street
Orem, UT 84058
(800) 678-1412

Wisc-Ware
1210 West Dayton Street
Madison, WI 53706
(800) 543-3201

Xpercom
3605 Luallen
Carrollton, TX 75007
(214) 492-8530

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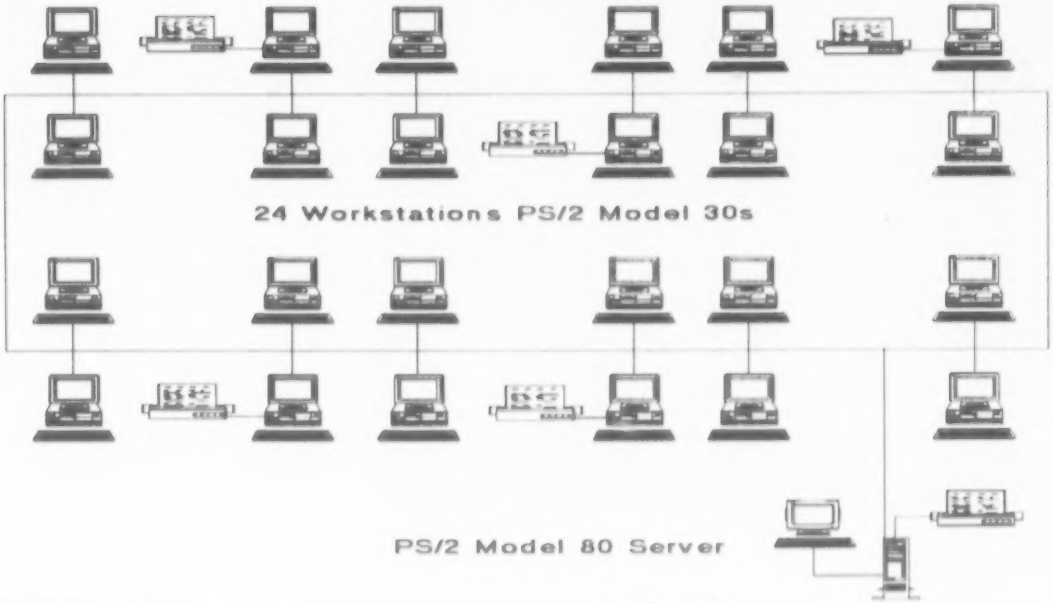
Appendix C

Description of the Electronic Classroom

Hardware/Software Configuration



HARDWARE

Server-1
- IBM PS/2 Model 80-311
  - 8 Mb memory
  - 2 300 Mb hard disks
  - 1.44" floppy drive
  - Internal Tape Back-up
  - Mouse
  - 8513 Monitor

WorkStations-24
- IBM PS/2 Model 30-286
  - 2 Mb Memory
  - 30 Mb hard disk
  - 1.44" floppy drive
  - Mouse
  - 8513 Monitor

Printers-6
- 1 IBM Proprinter III XL
  - Connected to server
- 5 Proprinter XL
  - Connected to Workstations
  - (Software configures them as network printers)

SOFTWARE

Operating Systems
- DOS 4.0
- Novell Netware 2.15
- ICLAS-IBM Classroom LAN Administration System
- Windows 3.0 on Workstations running under ICLAS.

Operations

When each workstation is booted a batch file allows the option to go to PLATO or ICLAS.

If PLATO is chosen then the workstation can runs the software:
- PLATO

If ICLAS is chosen , then the following software are available under ICLAS:
- Realtime Writer
- CSR
- WordPerfect 5.1
- Write under Windows 3.0

Recommended Modifications: 2 laser printers rather than the 6 dot matrix printers. 1 dedicated administrative workstation with the internal tape drive. This means at least a Model 50 PS/2.

Applications Software Descriptions

Computerized Placement Tests
distributed by

The College Board
P.O. BOX 6800
Princeton, NJ 08541-6800
(609) 734-5782 or (215) 750-8410

Computerized Placement Tests (CPTs) represent an assessment program based on computerized adaptive testing techniques. This methodology customizes tests according to each student's abilities, presenting a student with a series of test questions at the appropriate level of difficulty for his or her abilities, knowledge, and background. Questions that are either too difficult or too easy are avoided, and accurate results are obtained with fewer questions administered with no time limit. These tests greatly benefit students in institutions where developmental courses are available.

The CPTs are untimed and require little proctor intervention. They include Reading Comprehension, Sentence Skills, Arithmetic Skills, Elementary Algebra, and College-Level Mathematics. Each test has from 12 to 20 questions selected from a pool of 100 questions and usually takes about 15 to 20 minutes to complete. Based on user experience, a typical student takes from three to four tests, and spends a total of about *90 to 100* minutes on them. About half of this time is used by the student to complete the sign-on procedure, answer the background questions, go through the familiarization screens, and take the two verbal tests (Reading Comprehension and Sentence Skills). The remainder of the time is usually spent on the mathematics tests. The tests that are administered to students are determined solely by the institution. Initial questions are selected randomly from those of average difficulty. Subsequent questions are automatically selected based on the answers to the prior questions(s). Students' scores depend on the difficulty of the questions they answer correctly.

Realtime Writer
distributed by

Realtime Learning Systems, Inc.
2700 Connecticut Avenue, N.W.
Washington, D.C. 20008
(202) 483-1510 or (800) 832-2472

Realtime Writer is a tool for interactive group learning in a computerized classroom environment.

It is quite simple in concept. Students sit in a classroom at a series of interconnected computers, and communicate with each other by typing on the keyboards of their individual computers and reading their computer screens. The communication is live - it occurs in real time.

In its simplest use, the software controlling the computers divides the screen of each monitor into two rectangular areas called windows. A student types his or her message in a private (lower) window dedicated to serving just that one student. When satisfied with the message, the student presses a key to send the passage to the public (upper) window that appears instantly on other students' screens. There, in a scrolling dialogue, it joins messages other students have sent.

As in all classrooms, the use of this unique software is dependent on the goals, the skills, and the ingenuity of the teacher. Participation is readily available to all students. Students seem to enjoy using the system and are engaged by it.

Rather than having all students talk at once on the same channel, during most sessions involving more than a handful of students, students will typically be placed into small groups and will communicate within their group on a single channel.

It is important to realize that teachers exercise decision-making in initiating discussions, and to an extent they can control the direction of that discourse. But there is also a dynamic at work with this system which makes this classroom

setting very democratic. This occurs because students, as well as the teacher, can control the direction of their conversations. This is a process which can cause discomfort for some teachers.

Functions are provided for teacher-managed course material presentation, for recording and printing of class conversations, and for managing class rosters.

PLATO
distributed by

The Roach Organization, Inc.
2607 Oberlin Road, Suite 100
Raleigh, NC 27608
(800) 869-2000

The **PLATO** curriculum meets student needs from remediation to mainstream to enrichment. Because of its flexible design, the PLATO curriculum can assist faculty in the often complex planning required for effective competency-based individualized instruction.

The lessons are sequentially designed to reinforce skills previously learned, yet each lesson retains the ability to stand alone. This unique modularity allows faculty to design individual programs according to each student's needs.

The Basic Literacy program (3 - 8 grade level skills) in PLATO consists of 258 lessons in reading, 139 in writing, and 192 in mathematics. The Advanced Literacy program (9 - 12 grade level skills) consists of 82 lessons in reading, 87 in writing, and 263 in mathematics.

The PLATO Curriculum Manager allows faculty to collect information on the status of students. Reports that show the progress of students, how many times they have worked with a particular lesson, etc., can be printed. In addition, instructors can display all of the main modules or *Routing Activities* set up on the system to see what lessons are offered.

A routing activity is made up of a collection of lessons and tests. When students are registered in a course, they can be assigned to a given routing activity. When students sign on, they will be presented with a menu of options that will guide them through the lessons assigned to them.

CSR
distributed by

Computer Systems Research, Inc.
Avon Park South
P.O. BOX 45
Avon, CT 06001
(609) 387-7121
(800) 922-1190

CSR's Integrated Learning System (ILS) consists of curriculum software and the associated management components. The *CSR Basic Skills* offering includes more than 400 courses (modules) which teach individual reading, writing and math skills. The modules are organized into five levels, level V representing college-level skills.

Each CSR module begins with a pre-test. If a student passes that pre-test, he is immediately referred to the next module on the list. If the student fails the pre-test, he is led into a tutorial which offers an explanation of the topic and guides the student through a number of step-by-step examples. The examples are followed by a series of practice exercises in which the student is asked to furnish correct responses. Incorrect responses are met with helpful hints and suggestions. Once the practice exercises have been completed, the student is given a post-test. If the student passes it, he is ushered to the next module. If the student fails the post-test, he is led through the same tutorial a second time. Regardless of whether the student passes or fails the post-test the second time, the student is moved to the next module. Only after all of the modules in the segment have been completed is the student allowed to go through the failed module(s) a third and final time. All of the courses are presented in color.

CSR's management components assist the faculty in designing and delivering a predetermined sequence of modules to their students, keep track of the students' time on task and progress, and provide reports on individual students as well as for the class.

Steering Committee Members

Jon Alexiou
(Committee Chair)
Vice President for Education
Miami-Dade Community College
Miami, Florida

Kamala Anandam
(Project Director)
Associate Dean, Educational Technologies
Miami-Dade Community College
Miami, Florida

Lamore J. Carter
Vice President for Academic Affairs and Research
Grambling State University
Grambling, Louisiana

Don Doucette
Associate Director
The League for Innovation in the Community College
Laguna Hills, California

Polly Glover
Coordinator, Student Learning Center
University of Tennessee at Martin
Martin, Tennessee

Tom Griffin
Dean of Instructional Development and Innovation
Central Piedmont Community College
Charlotte, North Carolina

Rodger Pool
Associate Vice Chancellor of Educational Affairs
Dallas County Community College District
Dallas, Texas

Dan Radakovich
Vice President for Academic Affairs
Johnson County Community College
Overland Park, Kansas

David Scott
Assistant Chancellor
Personnel
Kern Community College
Bakersfield, California

Project Team Members

Division of Educational Technologies
Miami-Dade Community College
Miami, Florida

Kamala Anandam
Project Director

Lorne Kotler
Software Reviews Coordinator

Victor Nwankwo
Software Implementation Coordinator

Ed Eisel
Project Analyst

Jesus Rodriguez
Programmer

Barbara O'Brien
Software Porting Coordinator

Anays Fuentes
Database Manager

Maria Ojeda
Secretary

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